Executive Summary

The 2013 – 2014 academic year was a very successful one for the School of Sciences and Mathematics (SSM). We welcomed six new faculty, our faculty continued their stellar record of publication and securing extramural funding, and we were able to significantly advance several capital projects. In addition, the number of majors in SSM remained very high, we ranked with the major South Carolina research institutions in producing graduates in STEM fields, and we continued to provide research experiences for a significant number of our students.

We are very proud that our six new faculty members include three that are minorities or female, underscoring our commitment to enhance diversity among our faculty. These individuals and their colleagues published 185 papers in peer-reviewed scientific journals, many with undergraduate co-authors. Faculty also secured $2.4M in new extramural grant awards to go with the $13.1M of continuing awards.

The build-out of 19,000 sq. ft. of space in the SSMB was completed in December 2013, permitting the Department of Geology to re-unify in the building in January 2014. The new space includes faculty offices, teaching and research laboratories, and specialized research facilities. During the 2013-14 AY, ground was broken for two 3,000 sq. ft. field stations at Dixie Plantation, with construction slated for completion in Fall 2014. In addition, the SSM dean’s office expended tremendous effort this year to secure adequate swing space for the renovation of the Rita Hollings Science Center and completed programming for the new facility.

SSM continued 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 still dominate lists of the hottest employment fields. For instance, Forbes Magazine published in 2013, 15 Most Valuable College Majors, showing math and science majors to be well represented (see below). In the Gen-Y researcher Millennial Branding survey, employers reported computer information systems majors as top recruits and noted that the new data-driven market makes math skills, particularly statistics, more and more valuable to employers. Charleston itself is seeing a growth demand for workers in STEM fields, particularly in computer science. SSM is committed to moving students successfully to these employment opportunities.

15 Most Valuable College Majors

<table>
<thead>
<tr>
<th>Field</th>
<th>Starting Median Pay</th>
<th>Mid-Career Median Pay</th>
<th>Growth in Pay</th>
<th>Projected Job Growth</th>
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</thead>
<tbody>
<tr>
<td>Biomedical Engineering</td>
<td>$53,800</td>
<td>$97,800</td>
<td>82%</td>
<td>61.7%</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>$41,700</td>
<td>$84,700</td>
<td>103%</td>
<td>30.8%</td>
</tr>
<tr>
<td>Computer Sciences</td>
<td>$56,600</td>
<td>$97,900</td>
<td>73%</td>
<td>24.6%</td>
</tr>
<tr>
<td>Software Engineering</td>
<td>$54,900</td>
<td>$87,800</td>
<td>60%</td>
<td>24.6%</td>
</tr>
<tr>
<td>Environmental Engineering</td>
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<td>$88,600</td>
<td>71%</td>
<td>21.9%</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>$53,100</td>
<td>$90,200</td>
<td>70%</td>
<td>19.4%</td>
</tr>
</tbody>
</table>
### School of Sciences and Mathematics

#### Annual Report 2013-2014

<table>
<thead>
<tr>
<th>Program</th>
<th>2013</th>
<th>2014</th>
<th>Increase</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geology</td>
<td>$45,300</td>
<td>$83,300</td>
<td></td>
<td>84%</td>
</tr>
<tr>
<td>Management Information Systems</td>
<td>$51,000</td>
<td>$88,200</td>
<td></td>
<td>73%</td>
</tr>
<tr>
<td>Petroleum Engineering</td>
<td>$97,900</td>
<td>$155,000</td>
<td></td>
<td>58%</td>
</tr>
<tr>
<td>Applied Mathematics</td>
<td>$52,600</td>
<td>$98,600</td>
<td></td>
<td>88%</td>
</tr>
<tr>
<td>Mathematics</td>
<td>$47,000</td>
<td>$89,900</td>
<td></td>
<td>91%</td>
</tr>
<tr>
<td>Construction Management</td>
<td>$50,200</td>
<td>$85,200</td>
<td></td>
<td>70%</td>
</tr>
<tr>
<td>Finance</td>
<td>$46,500</td>
<td>$87,300</td>
<td></td>
<td>88%</td>
</tr>
<tr>
<td>Physics</td>
<td>$49,800</td>
<td>$101,000</td>
<td></td>
<td>103%</td>
</tr>
<tr>
<td>Statistics</td>
<td>$49,000</td>
<td>$93,800</td>
<td></td>
<td>91%</td>
</tr>
</tbody>
</table>

Source: **Forbes Magazine**

### 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, 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 summer jobs in unrelated areas so they can stay focused on their research and to travel to conferences where they present their findings.

The Department of Mathematics furthered the personalization of education with the implementation of the ALEKS. This 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 the number of successful experiences at the College.

The School of Sciences and Mathematics continued to play a strong role in the College’s study abroad programs. Faculty led students to Panama, Indonesia, Ecuador and the Galapagos Islands, India, the U.S. British Virgin Islands, Greece, China, and Panama. Exchange programs were established with Xiamen University in China and the University of Tartu. The Department of Mathematics began negotiations for an exchange program with the University of São Paulo in Brazil.

Geology students completed their annual Maymester field studies trip which was comprised of three weeks of mapping geological sites in Utah, Arizona, Nevada, and California. Sites included Yosemite National Park, Zion National Park, Cathedral Gorge, and North Rim, Grand Canyon. Geology faculty also led field courses in the Bahamas and on seafloor mapping cruises.

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 recently listed among the Top 10 Marine Biology Colleges in the United States. The program is located at the Grice Marine Laboratory on James Island and offers the unique opportunity to collaborate and work with a large, diverse group of dedicated marine 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. In 2014 the College began construction of two field stations at Dixie Plantation. These zero carbon footprint, self-sustaining buildings will provide classrooms right in the heart of this diverse ecosystem. The field stations will house classes offered in biology, geology, astronomy, and environmental studies. Completion is scheduled for October 2014 and we hope classes will be held in these buildings as early as Spring 2015.

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 however, now that the Department of Computer Science is housed at Harbor Walk, all but one of those courses will be moved to Harbor Walk so faculty and students are working in the epicenter of the program. CSCI still 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 available.

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, was recently named 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 and the neuroscience minor have seen increased enrollments.

Environmental Studies has greatly expanded the availability of ENVT 200: Introduction to Environmental Studies in an attempt to keep pace with the growing demand. One reason for the increase in enrollment is the new Public Health degree as ENVT 200 meets a major requirement. A program planning summary is complete and waiting for approval to move the minor to a B.S./B.A. degree. Seth Pritchard, Associate Professor of Biology, serves as Director of the ENVT minor.

The minor in Neuroscience has also seen a steady increase in the number of graduating minors. The 2014-2015 academic year will see the highest number of declared minor, rising seniors to date. Nearly all of minor graduates (88% this year) indicated on their senior survey they would have preferred a Neuroscience major if it were available. A proposal to create a major was submitted to the invested departments (Biology, Psychology, and Physics) in February. The proposal received strong support from
Biology and Physics but not Psychology leaving the future of the major unknown. Until recently, Beth Meyer-Bernstein, Associate Professor of Biology, served as Director of the NEURO minor.

**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 discipline secured $1.1M in newly acquired funds from sponsors such as the National Science Foundation, Marine Biological Association of the UK, and Medical University of South Carolina.

Faculty members from other disciplines also take advantage of the College’s unique location. Funded research includes:

1. Earthquake Mitigation Plan and Education Outreach
2. Evaluating Water Quality Parameters in the Coastal Waters of South Carolina Using Satellite Data
3. Effects of Pharmaceutical Photodegradation Products in Freshwater on Local Amphibians
4. Folly Beach County Park: 2-year Renourishment Survey Program

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. Fall 2014 incoming students hail from institutions such as: Texas A&M; Brigham Young; Clemson; University of California; University of Tennessee; Saint Lawrence University; and University of Alabama.

The Masters of Environmental Studies program enrollment has increased, with 113 students actively enrolled and/or working on internships and thesis projects during the last year compared to the 88 on record for 2012-2013. A total of 28 new students enrolled in the MES program in the 2013-2014 academic year. Out-of-state students represented 57% of this total. This small increase, up from 53% last year, shows that the presence of the program is reaching outside the state of South Carolina.

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. An associate 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.

Enrollment numbers mentioned above seem to imply a growing program but are actually representing a backlog of students unable to obtain their degree within the normal 2-3 time frame. If the College is committed to enhancing this program, dedicated faculty lines would be a much appreciated gesture.
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.
Incoming Computer Science majors were awarded merit-based scholars paid for by a special state appropriation in the amount of $400,000. These funds will support both in-state and out-of-state students and are renewable for four years. The appropriation was provided to support the College and the regions dedication to making Charleston a growing digital corridor by attracting the brightest and best to the area. The female population in the department of computer science is on the rise and is now up to 24% of the CSCI student body. Programs like Women in Computing help mentor and retain this demographic.

In an effort to retain minority students the Chemistry department offered CHEM 103, a pre-CHEM 111 course for nine students who participated in the SCAMP/SPECTRA Summer Bridge program. After two summer session, these students averaged 3.42 whereas the average GPA in CHEM 111 for minority students not in the SPECTRA program was 1.6.

This fiscal year Boeing continued to provide four scholarships for students interested in pursuing careers in the aerospace industry. The W. Frank Kinard Chemistry endowment continues to grow and provide funding for scholarships.

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.
In January 2014, the Department of Geology and Environmental Geosciences moved into 19,000 square feet of new laboratories, classrooms, and faculty offices in the School of Sciences and Mathematics Building located at 202 Calhoun Street.

Final approvals were received to move forward with the renovation of the Rita Hollings Science Center located at 68 Coming Street. The building is being evacuated in order to renovate labs, classrooms, faculty offices, the observatory deck, and Physicians’ Auditorium. The $60M project is expected to last approximately 18 months. The College acquired 45,000 square feet of space at Harbor Walk to support displaced classrooms, labs, and offices.

The Department of Computer Science has also moved to newly acquired offices at Harbor Walk. This location allows faculty and students access the fast growing Charleston digital corridor.

Spaces vacated by CSCI in JC Long will serve as temporary offices and classrooms for the Department of Physics & Astronomy. Additional labs for faculty research have also been acquired through agreements with South Carolina Research Authority and the Medical University of South Carolina.

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 2012-2013

<table>
<thead>
<tr>
<th>Department</th>
<th>Subject</th>
<th>Fall 2013</th>
<th>Fall 2014</th>
<th>Spring 2013</th>
<th>Spring 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>BIOL</td>
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<td>5160</td>
<td>150</td>
<td>4591</td>
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<td>5160</td>
<td>150</td>
<td>4591</td>
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<td>Chemistry and Biochemistry</td>
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<td>0</td>
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<tr>
<td>TOTAL</td>
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<td>46</td>
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<td>23</td>
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<td>0</td>
<td>1950</td>
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<tr>
<td>TOTAL</td>
<td></td>
<td>0</td>
<td>1835</td>
<td>0</td>
<td>1950</td>
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<tr>
<td>Mathematics</td>
<td>MATH</td>
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<td>4054</td>
<td>50</td>
<td>3099</td>
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<tr>
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<td></td>
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<td>4054</td>
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<td>Physics and Astronomy</td>
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<tr>
<td>School Total</td>
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<td>203</td>
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</table>

#### Average Class Size

<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>27.2</td>
</tr>
<tr>
<td>Chemistry and Biochemistry</td>
<td>CHEM</td>
<td>24.6</td>
</tr>
<tr>
<td>Computer Science</td>
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<td></td>
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<td>Geology and Environmental Geosciences</td>
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<td>28.2</td>
</tr>
<tr>
<td>Mathematics</td>
<td>MATH</td>
<td>34.8</td>
</tr>
</tbody>
</table>
Fall enrollments were up from 2012 in all six departments. The 118 tenure-track 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 division and graduate courses. 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 division major courses. Additional instructor lines would improve these circumstances. For more information refer to Assessment.
Research and Professional Development
This year Science and Math faculty members obtained $2.4M in newly awarded research grants and continued work on $13.1M in ongoing grants. They published 185 articles in peer reviewed journals and presented their research at both national and international conferences. Grants obtained for professional research can be found in Appendix A. Publications in refereed journals can be found in Appendix B.

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. Examples of these activities include:

- Robert Mignone: Chair, General Education Committee
- Deb Bidwell: Sustainability Committee
- Christine Byrum: Academic Standards; Admissions and Financial Aid Committee; Student group instructor at Convocation
- Andrew Clark: Faculty Welfare Committee
- Isaure DeBuron: Student Fulbright Campus Committee; Nominations and Elections Committee
- Jack DiTullio: Fulbright Student Review Committee
- Phil Dustan: At-Large Departmental Senator
- Melissa Hughes, Wendy Cory, Jim Bowring: SCAMP Advisory Board
- Mark Lazzaro: Tenure, Promotion, and Third Year Review Committee
- Eric McElroy: Graduate Council; Institutional Animal Care and Use Committee
- Bob Podolsky: Faculty Advisory Committee to the President
- Gorka Sancho: Faculty Advising Award Selection Committee
- Andrew Shedlock: Faculty Senate
- Jeff Triblehorn: Research and Development Committee
- Jason Vance: Liberal Arts and Sciences Small Grants Program Committee
- Reid Wiseman: Hearing Committee, alternate
- Brooke Van Horn: Chair, Graduate Education Committee
- Marion Doig: Budget Committee
- Jim Bowring: Faculty Committee on Academic Standards

Faculty members also serve on national and regional committees within their discipline

- Jim Deavor: Secretary/Treasurer, American Chemical Society South Carolina Section
- Robert Dillon: President, South Carolinians for Science; Councilor, Charleston Chapter Sigma Xi.
- Karen Burnett: Membership Committee Coordinator, Charleston Chapter, Sigma Xi
- Renee McCauley: President/Elect/Past, ACM Special Interest Group in Computer Science Education
- Norm Levine: National Division Chair, Environmental and Engineering Geology Division of the Geological Society of America
- Cass Runyon: Statewide Director of South Carolina Space Grant Consortium (SCSGC) and the South Carolina National Aeronautics and Space Administration Experimental Program to Stimulate Competitive Research (NASA EPSCoR)
- Cynthia Hall served as Chair of the Charleston STEM Festival Logistics Committee and as a member of the Planning Committee.
- James Neff was a rotating program officer at the National Science Foundation.

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. In late June 2013 Mr. Brown gifted his $1.6M collection of fossils to the School and plans are underway to expand the museum which will include an entire exhibit focused on whale evolution.

On February 27, 2014, the School of Sciences and Mathematics teamed up again with Athletics to provide hands-on activities to over 2000 local school children who attended the 2nd 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 James Madison. This popularity of this event demonstrates the need for STEM education outreach. Planning has already begun for 2015.

SSM also partnered with the RiverDogs in a similar event held at Joe Riley Jr. Park. Education Day or STEM at The Joe was held on April 9, 2014, with 5934 students from 37 schools in the Tri-County Area in attendance. Faculty, staff, and students provided hands-on exhibits in the picnic area where students could visit at their leisure during the first 5 innings of the game. Marketing and Communications helped to produce four videos or “science shorts” that were shown on the large outfield monitors. Faculty combined fun facts with their love of baseball to create teaching moments that demonstrate how science and math are fun and relevant in sports. These videos were added to the RiverDogs promotions material rotation and were shown during subsequent games to the general public.
On December 13, 2014 Wendy Cory, Department of Chemistry and Biochemistry, worked with the **Literacy Outreach Initiative (LOI)** to coordinate a hands-on science experience that complimented “Tracking Trash” by Loree Griffin Burns. Approximately 80 students from Charleston County School District, who were currently reading the book, visited campus to learn how to use microscopes and hear a representative from the Charleston Water System speak about the effects of plastics on water quality. Students learned how to determine the difference between biodegradable and non-biodegradable packing materials. This event was sponsored by a grant from the National Science Foundation.

On June 13-14, 2014 Christine Moore, Department of Computer Science, hosted 150 girls age 10 through 17 at **Geek Squad Summer Academy**. The event included robot design, LEGO competitions, 3-D printing, and social media etiquette all in the interest of teaching the latest technology in a fun, interactive environment.

The **2014 Darwin Week** was held February 9-13, 2014. This year’s week long lecture series coordinated by Robert Dillon focused on the question “What does it mean to be Human?” Lectures debated popular issues such as evolution and adaptability of organisms and life in the universe. Lectures also examine the effects of science on religion such as brain activity and its relationship to religious impulse. Over 1000 students and members of the general public attended the seven lecture series held in various locations at the College, the Citadel, Church of Holy Communion, and Circular Congregational Church. This event was presented as part of Charleston’s 2014 STEM Festival.

This year’s **Math Meet**, organized by Alex Kasman, Professor of Mathematics, attracted 641 students from 51 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 event achieved its goal of making many students feel like winners; 26 of the 51 schools that participated took home at least one award.

The **Lowcountry Regional Science and Engineering Fair** was held on April 1, 2014 at TD Arena. The Fair is open to students in grades 5-12 in Berkeley, Charleston, Colleton, Dorchester, and Georgetown counties. This year 73 students presenting 65 projects represented 12 schools including Academic Magnet Highschool, Porter Gaud, St. Andrews School of Math and Science, and Georgetown School of the Arts and Sciences. There were 46 volunteer judges from the organizations such as College of Charleston, Boeing/AIAA, MUSC, NOAA, the Citadel, and the United States Navy, Nuclear Power Training Command. The Fair is affiliated with the Intel International Science and Engineering Fair (ISEF). Senior Division first place winner Irene Cheng from Academic Magnet High School and her teacher Tyson McCormick represented the Lowcountry at ISEF in Los Angeles, CA. Their expenses were paid by the Lowcountry Science Fair.
and a donation from the Charleston Defense Contractors Association, a long-time supporter of the Fair.

**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. This year the CORAL conducted 17 events that served 1151 school children. In addition, CORAL regularly participates in group STEM outreach events such as STEM Day at TD Arena, Earth Fair in North Charleston, the Marion Square Green Fair which interface with thousands of students and adults in the Lowcountry. The CORAL touch tanks have become a highlight of these events.

Students from **Mitchell Elementary** made their annual visit to the School in January 2014 to experience hands-on science lessons. This event, now in its sixth year, provided learning opportunities in biology, chemistry, physics, and geology for over 200 students, grades 3-6. The 2-day field trip gave students an intimate connection with the scientific process by working in fully equipped, state-of-the-art laboratories, with real scientists.

**The Palmetto Scholars Academy (PSA)**, a Charleston County gifted and talented middle/high school, became the **SC Space Grant Consortium’s first K-12 educational partner** in Spring 2013. Students from PSA designed competitive experiments for the Student Spaceflights Experiment Program (SSEP) with the help of mentors from the National Oceanic and Atmospheric Administration (NOAA), Space and Naval Warfare Systems Command (SPAWAR), and SCSGC. Three of 78 proposals were submitted to the National Center for Earth and Space Science Education and leaders from NCESSE selected one proposal for spaceflight. The winning experiment flew aboard the International Space Station in February 2014 and was returned to students for analysis.

**Astronomy Observatory Open Houses** continue to be a successful monthly outreach program. Open Houses are held on the third Friday of each month during the academic year. The program is operated by faculty, staff, and undergraduates and has been well attended by the public and by school classes. Approximately 1000 people attended last year’s open house events.

In 2014, the School sponsored the inaugural **Charleston STEM Festival**. The Festival is an initiative of the Lowcountry STEM Collaborative whose goal is to bring STEM concepts to the community and demonstrate how STEM education and careers are vital for our local economy. The Festival aims to reach a broad and diverse audience by making science learning fun. The goal is to light a spark in those who participate, encouraging attendees to seek out additional experiences and new partnerships with STEM education providers. Cynthia Hall, Director of the Lowcountry Hall of Science and Math was on a member of the Planning Committee alongside representatives from the Citadel, Charleston Southern, Trident, Clemson, SC Aquarium, Patriots Point, Charleston County School District, and S2TEM Centers SC. The Festival took place on February 8, 2014. Faculty and staff from SSM joined nearly 40 exhibitors to entertain and educate through hands-on activities.
Faculty members regularly participate in outreach activities hosted by local and regional schools, career days, and science nights. Select educational outreach activities include:

- Andrew Clark delivered a laboratory tour and guest lecture for students in a Vertebrate Zoology course from the SC Governor’s School for Science and Mathematics. He also served as a consultant and interviewee for BBC/National Geographic Program “Richard Hammond’s Forces of Nature – Ice.”
- Isuare DeBuron spoke about fish anatomy and parasite discovery at Mason Prep Saturday Science.
- Jack DiTullio presented a lecture on Antarctic Oceanography to 5th – 8th graders at Five Oaks Academy in Simpsonville, SC.
- Courtney Murren coordinated the Arabidopsis project for high school teachers at Stiles Point Elementary and James Island Elementary. She also provides support for the home school program at Charleston County Library.
- Jean Everett and Dorian McMillan coordinated a rare plant rescue on Boeing property. They contributed photos and locality data for a new report of invasive apple snail (Pomacea) in Charleston area submitted to USGS Nonindigenous Aquatic Species Database by Robert Dillon.
- Brooke Van Horn facilitated “Nanoscience on Display” at North Charleston High School.
- Wendy Cory gave a seminar to two classes consisting of juniors and seniors from Ashley Hall. Students performed studies on the degradation of naproxen and toured lab facilities at SSMB.
- RoxAnn Stalvey coordinated an “Alice” programming language workshop for SC high school teachers. The project is funded by the NSF and is designed to integrate the programming language into K-12 schools throughout the US.
- Jeff Wragg conducted physics interactive demonstrations for a group of 45 gifted and talented 5th graders at Haut Gap and gave two presentation/workshops on radiation to 8th graders at Mason Prep.
- Gardner Marshall represented the School at Aerospace Careers Day.
- Joe Carson co-led a teacher workshop for 15 middle school teachers at Berkeley County School District.
- Laura Penny presented astronomy and physics at the local St. Andrews School of Math & Science, Science Night.
- Ana Oprisan organized workshops for high school teachers from Summerville, Berkeley, and Dorchester.
- SCSGC contributed funds to support a Young Astronauts group (4th and 5th grade students) to travel to Kennedy Space Center.

ADDITIONAL INSTRUCTIONAL CONTRIBUTIONS

Contributions to the Honors College

The School of Sciences and Mathematics faculty contributed approximately 550 credit hours to honors courses. A second cohort of Honors students finished the new Honors Chemistry sequence which involves students taking organic immediately after Gen Chem 1. This expansion requires double the number of CHEM faculty needed to support these four courses. Computer
Science offered its first honors elective course and will continue to contribute one each year. Additional Honors offerings included:

- HONS 151/151L: Honors Biology/Lab
- HONS 115: Honors Calculus
- HONS 280: Differential Equations
- HONS 216: Conceptual Tour of Mathematics
- HONS 157/157L: Honors Physics/Lab
- HONS 159/159L: Honors Astronomy/Lab

### Contributions to the First Year Experience

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Course Code(s)</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bill Manaris</td>
<td>CITA 180/MUSC 146</td>
<td>Introduction to Computer Music and Aesthetics: Programming Music, Performing Computers</td>
</tr>
<tr>
<td>Iana Anguelova</td>
<td>HTMT 210/MATH 104</td>
<td>Measuring the Impacts of Tourism in Charleston</td>
</tr>
<tr>
<td>Cynthia Hall</td>
<td>POLI 103/GEOL 103</td>
<td>Movers and Shakers</td>
</tr>
<tr>
<td>Chris Korey</td>
<td>ENGL 110/BIOL 111</td>
<td>Microbes: Friend or Foe?</td>
</tr>
<tr>
<td>Amy Rogers, Jennifer Fox</td>
<td>CHEM 111/BIOL 111</td>
<td>Chemistry and Biology for Pre-Med Students</td>
</tr>
<tr>
<td>Deb Bidwell</td>
<td>BIOL 111/PSYC 103</td>
<td>Biology and Psychology: Gateway to Neuroscience</td>
</tr>
<tr>
<td>Erin Richard</td>
<td>BIOL 101/PEAC 102</td>
<td>The Modern Yogi: Fixing the Body by Steadying the Mind</td>
</tr>
<tr>
<td>Agnes Southgate</td>
<td>FYSM 109</td>
<td>Molecular Biology in the News</td>
</tr>
<tr>
<td>Dorian McMillan</td>
<td>FYSM 110/FYSM 110L</td>
<td>Nature and Man: Outdoor Experiences in the Coastal Plain</td>
</tr>
<tr>
<td>Brooke Van Horn</td>
<td>FYSM 111</td>
<td>The Good, the Bad, and the Reality of Nanoscale Science</td>
</tr>
<tr>
<td>George Pothering</td>
<td>FYSM 117</td>
<td>Android App Development for Liberal Arts</td>
</tr>
<tr>
<td>Christine Moore</td>
<td>FYSM 117</td>
<td>A Brand Like You</td>
</tr>
<tr>
<td>Vijay Vulava</td>
<td>FYSM 130</td>
<td>Understanding Environmental Pollution</td>
</tr>
<tr>
<td>Stephane Lafortune</td>
<td>FYSM 144</td>
<td>Mathematics in the Modern World</td>
</tr>
<tr>
<td>Lanie Affonso</td>
<td>FYSM 148</td>
<td>Technology and the Modern Enterprise</td>
</tr>
<tr>
<td>Chris Fragile</td>
<td>FYSM 154</td>
<td>Apocalypse to Warp Drive: Physics in Film</td>
</tr>
<tr>
<td>Alex Kasman</td>
<td>FYSM 177</td>
<td>Math in Fiction</td>
</tr>
<tr>
<td>Melissa Hughes</td>
<td>FYSM 112/ENGL 110</td>
<td>Life, the Universe, and Writing about Everything</td>
</tr>
<tr>
<td>Allison Welch</td>
<td>FYSM 109</td>
<td>Biology of Sex and Gender</td>
</tr>
<tr>
<td>Lanie Affonso</td>
<td>FYSM 117</td>
<td>What Does Google Know?</td>
</tr>
<tr>
<td>Erin Beutel</td>
<td>FYSM 130</td>
<td>Earth Detectives</td>
</tr>
<tr>
<td>Lanie Affonso</td>
<td>FYSM 148</td>
<td>Technology and the Modern Enterprise</td>
</tr>
</tbody>
</table>

### Distance Education

The need to provide hands-on laboratory experiences limits the feasibility of on-line courses in some of our natural science programs. However, for the first time, a BIOL 111 lecture in Summer I and BIOL 112 in Summer 2 were offered on-line. Additionally, BIOL 101 and 102 were
also available. The Physics & Astronomy taught an online course on Meteorology. Departments may offer more on-line courses in the future as demand and logistics permit. Other recent online course offerings included:

- CSCI 490: Information Security Principles
- MATH 104: Elementary Statistics
- EVSS 601: Economic Theory for Policy Analysis

**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; and Languages, Cultures, and World Affairs. The Department of Biology finds itself servicing large numbers of non-majors, particularly Health and Human Performance majors interested in careers in allied health fields.

**International/Global Initiatives**

Summer study abroad programs for the 2013-2014 academic year included:

- **BRITISH VIRGIN ISLANDS**, Faculty Directors Rusty Day and Phil Dustan, BIOL: Students studied biology, ecology, and conservation of the Caribbean coral reef ecosystem.
- **GEOARCHAEOLOGY IN GREECE**, Faculty Director Scott Harris, GEOL: Students were immersed into the landscape and coastal regions of Mitrou in Central Greece where they study the geology and evolution of the local landscape.
- **INDIA**, Faculty Directors Tim Callahan and Vijay Vulava, GEOL: This course focused 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.
- **INDONESIA**, Faculty Director Phil Dustan, BIOL: Located in the province of Bali, this program 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 become familiar with ecological processes at they apply to tropical ecosystems.
- **PANAMA**, Faculty Director Craig Plante, BIOL: The course fulfills a lecture and lab course in ecology required for marine biology majors. A significant portion of the lab is spent in the tropical setting.

**Additional Programs and Centers**

*Project Oceanica*’s goal is to integrate education with oceanographic research and exploration, and to develop educational resources and programs available to college and high school students as well as K-12 educators. The program was established in 2009 and has recently expanded to include the School of Oceanography at the University of Washington. The Benthic Acoustic Mapping and Survey Program (BEAMS) program is operated solely through partnerships with several private industry organizations. CARIS Geospatial Software Solutions offers free software training to “BEAM Team” students each semester. BEAMS is the only
program of its kind on the east coast. Many graduates of the program have obtained employment in private and government offices or are independently contracted marine surveyors and geophysicists, such as Joshua Mode ’08 who work for CARIS, Inc. as a Technical Solutions Provider and Academic Partnership Coordinator. Joshua leads the instruction for the Seafloor Mapping CARIS HIPS multibeam sonar software training workshop. Over 100 students have completed the program in SC and WA.

**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** provides a mechanism for communications, collaboration, and coordination between the College of Charleston and the STEM community in the Lowcountry. LHSMS programs serve K-12 public, private, home school, and pre-service educators by providing access to science and mathematics curricula and materials, professional
development opportunities, and more. LHSM houses a resource library which contains a variety of math and science materials for K-12 education including standards-based kits, math manipulatives, equipment, textbooks, professional journals, and more. Materials are available for loan free of charge. LHSM offers professional development opportunities for educators, field trips to the Hall, or site visits to classrooms or school science nights to present hands-on activities.

**South Carolina Earthquake Education & Preparedness Program (SCEEP)** 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 faculty is comprised of approximately 28% females, the largest underrepresented group in STEM fields, and approximately 20% of ethnicities other than Caucasian. A comparison of the percentage of women and minorities receiving terminal degrees in various STEM fields, and our employment percentages in those fields is shown below.

<table>
<thead>
<tr>
<th>CIP</th>
<th>Discipline</th>
<th>Minorities</th>
<th></th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IPEDS</td>
<td></td>
<td>CofC</td>
</tr>
<tr>
<td>11</td>
<td>Computer and Information Science and Support Services</td>
<td>12.3%</td>
<td>16.7%</td>
<td>19.4%</td>
</tr>
<tr>
<td>26</td>
<td>Biological and Biomedical Sciences</td>
<td>18.4%</td>
<td>5.0%</td>
<td>53.6%</td>
</tr>
<tr>
<td>27</td>
<td>Mathematics and Statistics</td>
<td>9.7%</td>
<td>12.1%</td>
<td>29.1%</td>
</tr>
<tr>
<td>40</td>
<td>Physical Sciences</td>
<td>10.3%</td>
<td>13.7%</td>
<td>34.0%</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 2013-2014 academic year six new roster faculty members began teaching in five of the six academic departments.
- BIOL: Renuad Geslain, Caucasian Male, Assistant Professor, Ph.D. University of Strasbourg, France
- CHEM: Tim Barker, Caucasian Male, Assistant Professor, Ph.D. University of California, Irvine
- CSCI: William Bares, Hispanic Male, Assistant Professor of Computer Science, Ph.D. North Carolina State University
- CSCI: Aspen Olmsted, Caucasian Male, Senior Instructor of Computer Science, M.S. College of Charleston
- GEOL: Barbara Beckingham, Caucasian Female, Assistant Professor, Ph.D. University of Maryland
- PHYS: Gabriel Williams, African American Male, Ph.D. Colorado State University

**Student Diversity Efforts**

The **South Carolina Alliance for Minority Participation** funds minority students (African American, Hispanic, and Native American) interested in pursuing a degree in science or math. SCAMP provides an opportunity for students to challenge themselves academically and increases their chances for academic success. 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 that helps students build a better foundation for introductory chemistry courses. After completing this session these students averaged 3.42 whereas the average GPA in CHEM 111 for minority students not in the SPECTRA program was 1.6.

Currently 29 students participate in SCAMP with 12 new students currently enrolled in SPECTRA, 6 of whom are also in the Honors Program. Eight students participated in summer research projects and presented at the annual SCAMP Research event. Some of these students’ accomplishments include:

- Amber Frazier: Will attend Morehouse School of Medicine’s Master of Science in Medical Science Program, Fall 2014.
- Brandi Rollins: Will attend MUSC College of Dental Medicine, Fall 2014.
- Jan Enabore: Will teach AP Biology, CP Biology, and Honors Human Physiology at Pinewood Preparatory School in Summerville.
- Andrea Creech: Recipient of the J. Gorman ’43 and Gladys Thomas Endowed Memorial Alumni Scholarship which is awarded to a student who plans a career in medicine.
- Lidoshka R. Marc: American Institute of Chemists & Chemical Engineers Award.

**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, the program has helped to nearly double the number of female majors in the department to 23% of its student body. The national average is 18%.
With the assistance of the Pre-Professional Health Advising Office, the School hosted the National Institute of Health’s Bench to Bedside Program (B2B) offered through the Advanced Health Education Center (AHEC). The program is designed to produce more qualified applicants from underrepresented groups to diversify the healthcare system in South Carolina. B2B is a collaborative initiative between the Medical University of South Carolina, College of Charleston, Clemson, Catlin, and Coastal Carolina.

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 diversity report can be found in Appendix C.

ASSESSMENT ACTIVITES
Assessment takes place at both the school-wide and departmental/programmatic levels. School-wide assessment looked at what type of faculty provides instruction in our introductory general education courses, how many students participated in undergraduate research, and laboratory safety. The results show that we need additional lines to provide roster faculty to teach in introductory lectures and thus lessen our dependency on adjuncts (42% of intro students are taught by adjuncts), that we have a growing number of undergraduate research students and that we require more resources to provide similar opportunities to more students (198 for credit in FY 13, 234 for credit in FY ’14), and that our safety efforts continue to improve (departmental safety committees are becoming more active). Departments assessed aspects of their program that were important to them. Assessment of the General Education courses was undertaken for the first time as it was also done for the first time across the College. The School’s assessment report can be found in Appendix D.

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 these undergraduates 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. This year approximately 250 students worked in a research lab with over 50 experiences resulting in student author credit on an article published in a refereed scientific journal.

In November 2013, the School held its second 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 2014.
SSM students were awarded 66 research grants from the Office of Undergraduate Research and Creative Activities. A complete list of awards and abstracts for SURF grants can be found in Appendix E.

The 26th Annual Undergraduate Research Poster Session featured 119 posters representing the work of 268 students. A complete list of abstracts can be found in Appendix F. 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 Enzyme Meeting; Lunar and Planetary Sciences Conference; Geological Society of America; USA CARIS 2014 Conference.

Awards and Distinctions:
- Candice Alge: Winner of the Claudia-Porter-Stewart Undergraduate Presentation Award, Southeastern Society of Parasitologists
- John Brooker: Best Undergraduate Oral Presentation and Recipient of SEERS Student Travel Award, Southeastern Estuarine Research Society
- Alix Generous: TEDxABQ Speaker, September 7, 2013
- Tiffani Smalls: Innovation Under 35 Award, National Council of Negro Women
- Vanessa Bezy: Research Fellowship, National Science Foundation. She will begin work on her Ph.D. at the University of North Carolina.
- Logan Herbert: Named the American Chemical Society, SC Section, Outstanding Student
- Lidoshka Marc: Awarded the American Institute of Chemists and Chemical Engineer Award in Chemistry
- Mai-Trin Pham: Awarded the American Institute of Chemists and Chemical Engineer Award in Biochemistry
- Will Jamieson: Developed the Front Flash app which was downloaded by 1M users and received $10M in investment money to develop Yik Yak, an anonymous messaging app geared toward college students.
- Sarah Sharpe, Tim Hayward, and Kellen Lawson: South Carolina Academy of Sciences undergraduate research awards.
- Spectroscopy Team: Best Presentation at the National Student Solar Spectrograph Competition.
- College Chapter of Society of Physics Students: Named a Distinguished Chapter based on an assessment of the depth and breadth of activities conducted.
- The Charleston Chapter of Sigma Xi: Dedicated to encouraging original investigation in science, pure and applied, was awarded Chapter of Excellence for 2013.
- Logan Herbert: College of Charleston student EMS team named Organization of the Year by the National Collegiate EMS Foundation.
- Sarah Legendre: Chosen for Fulbright Summer Institutes at Durham University, UK.
- Steve Gorman, Mike Lis, and John Sussingham: Working on US Olympic Committee research projects using mathematics to rank US athletes and determining if our US incentive program is working.

External Scholarships
- Nathan Adamson received a Goldwater Scholarship for the ’14-’15 academic year

College Awards and Distinctions
- Logan Herbert: College of Charleston Bishop Robert Smith Award.

Select Faculty Awards and Distinctions
- Jack DiTullio: Fulbright Award for Distinguished Chair in Environmental Sciences at the Parthenope University in Naples for Teaching and Research in Oceanography
- Christopher Korey: Nerdscholar: 40 Under 40 Professors Who Inspire
- Aspen Olmsted: Outstanding Graduate Researcher, Computer Science & Engineering, University of South Carolina
- Joe Carson: College of Charleston Distinguished Research Award
- Joe Carson: Gordon E. Jones Distinguished Achievement Award
- Alem Teklu: Mebane William Marion Mebane Distinguished Teaching Chair in Physics

Recent Press
- Leslie Sautter: Rivers Under the Sea: Mapping Finds Ancient Bottom Habitat
- Jim Carew: A Whale of a Find: Fossil Sheds Light on Cetacean Sonar’s Origin
- Robert Dillon: Darwin Week Events Explore What it Means to be Human
- Mitch Colgan: Climate Change Campaign Makes a Stop at the Battery
- Joe Carson: CofC Professor Discovers New Worlds with International Team
- Jon Hakkila: Universe’s Largest Structure is a Cosmic Conundrum
- Student Research: The 8 Coolest Undergrad Research Projects at CofC Right Now
- Jack DiTullio/Various: Rhode Island Senator Visits Charleston to Learn About Climate Change

Promotional Videos
- Black Hole Accretion Disks, Developing Computer Simulations
- Chemical Rescue of a Mutant Version of a Computationally-designed Enzyme
- Ewan Oglethorpe ’12, Data Scientist
- “Selfies” and the Mobile App Entrepreneur
- $100,000 Grant for Genomics Undergraduate Research
- Academy Award Winning Visual Effects Artist Discusses Motion Graphics and Movies
- Undergraduate and Graduate Students Focus on Marine Research
- Marine Biology Internship, Coral Reef and Shark Research

Medical School Acceptances
The 2013-2014 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 30 students per week visited the Health Professions Advising Office. Of these, 114 students were accepted to professional schools including clinical programs in the following areas: medicine, dental, veterinary, pharmacy, allied health, and nursing. Students accepted to medical school totaled 56 (both MD and DO). The acceptance rate for medical school this year was 52%, the highest in the past 8 years.

Since the launch of Banner, the pre-health category helps to identify and track incoming pre-health students. As of June 2013, more than 700 students were designated as pre-health students with an assigned pre-health advisor.
### APPENDIX A: FACULTY GRANTS

<table>
<thead>
<tr>
<th>Principal Investigator</th>
<th>Department/Unit</th>
<th>Project Title</th>
<th>Sponsor</th>
<th>Amount Funded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrest, Sofia</td>
<td>MATH</td>
<td>Tensor SUMMA Math Camp</td>
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<td>Computational Genomics Support</td>
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<td>RUI: Elevated environmental CO2 impairs acclimation to hypoxia in crustaceans</td>
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<td>Burnett, Lou</td>
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<td>NERRS Evaluation Synthesis MES Graduate Student Landon Knapp</td>
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<td>Stringer Creek Hydrology</td>
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<td>Imaging Search for Dynamically Inferred Planets in Nearby Debris Disk Systems</td>
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<td>Collaborative work in conformal field theory</td>
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<td>Nucleophilic aromatic substitution in proteins: An old reaction for new</td>
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<td>Search for Commodore Joshua Barney’s War of 1812 Flotilla</td>
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<td>Folly Beach County Park: 2-year Renourishment Survey Program</td>
<td>Charleston County Parks and Recreation</td>
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<td>Harris, Scott</td>
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<td>Jaume, Steve</td>
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<td>Charleston, SC Area Earthquake Hazard Mapping Project (CAEHP) Workshop and Pilot Study: Collaborative Research with College of Charleston and University of Memphis</td>
<td>US Geological Survey</td>
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<td>Jones, Linda</td>
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<td>Computing in the Arts: A Community-Building Initiative</td>
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<td>LS-SCAMP 2013-2018</td>
<td>SC State University</td>
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<td>IPA Appointment</td>
<td>NSF</td>
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<td>Year 3: Supplement CAREER</td>
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<td>REU Site: A Pilot Distributed REU Site Focused on serving PHYS Students from Comprehensive and Community Colleges</td>
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<td>Podolsky, Bob</td>
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<td>REU: Research Experience in Marine Organism Health: Resilience and Response to Environmental Change</td>
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<td>SSERVI-Brown-MIT</td>
<td>Brown University</td>
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<td>State NASA EPSCoR Match - Year 7</td>
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<td>Rutter, Matthew</td>
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<td>RUI: Collaborative: unPAK: undergraduates Phenotyping Arabidopsis Knockouts: A distributed genomic approach to examine evolutionary important traits</td>
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<td>Rutter, Matthew</td>
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<td>Collaborative: RUI: The natural history of mutations: sequence and fitness data from A. thaliana mutation accumulation lines</td>
<td>National Science Foundation</td>
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<td>Sancho, Gorka</td>
<td>BIOL</td>
<td>The Pilot Fish Habitat Characterization Program (FishHab): Undergraduate Workforce Training in Ocean Fisheries Research</td>
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<td>Sautter, Leslie</td>
<td>GEOL</td>
<td>UW VISIONS '13 expedition</td>
<td>University of Washington</td>
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### APPENDIX A: FACULTY GRANTS

<table>
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<tr>
<th>Principal Investigator</th>
<th>Department/ Unit</th>
<th>Project Title</th>
<th>Sponsor</th>
<th>End Date</th>
<th>Amount Funded</th>
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<td>Sotka, Erik</td>
<td>BIOL</td>
<td>Detecting genetic adaptation during marine invasions</td>
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#### Ongoing FY14:

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<th>Sponsor</th>
<th>End Date</th>
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<tr>
<td>Hakkila, Jon</td>
<td>PHYS</td>
<td>Year 3: Quantified confusion: Stochastic process modeling of astronomical data</td>
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<td>Year 2: Conformational stability from variable-temperature infrared spectra of xenon solutions, ab initio calculations, and structural parameters of cyclohexanes with silicon atoms in the cyclic backbone</td>
<td>Camille and Hengry Dreyfus Foundation, Inc.</td>
<td>8/1/2013</td>
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<td>Guirgis, Gamil</td>
<td>CHEM</td>
<td>Earthquake Mitigation Plan and Education and Outreach: South Carolina 2011-2012</td>
<td>SECMD</td>
<td>8/30/2013</td>
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<tr>
<td>Beutel, Erin</td>
<td>GEOL</td>
<td>Phylogenetic effect on host use within generalist herbivores: a case study using marine amphipods in the family Ampithoidae</td>
<td>NSF</td>
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<td>Sotka, Erik</td>
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<td>Year 3: Collaborative Research: An EPSCoR Desktop to Teragrid Ecosystem</td>
<td>SCRA</td>
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<td>Pothering, George</td>
<td>CSCI</td>
<td>RUI: Ground-Based and Space-Based Direct Imaging Surveys for Extrasolar Planets</td>
<td>Howard Hughes Medical Institute (HHMI)</td>
<td>8/31/2013</td>
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<td>Carson, Joe</td>
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<td>Undergraduate Science Education Program, Year 4</td>
<td>Howard Hughes Medical Institute (HHMI)</td>
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<td>Agency</td>
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<td>Pritchard, Seth</td>
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<td>Supplement for RUI: Fine root production and architecture in a loblolly pine forest exposed to FACE: Interactive effects of atmospheric CO2 enrichment with soil N availability</td>
<td>NSF</td>
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<td>Bowring, Jim</td>
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<td>Subaward: Community Engagement to Inform EarthCube Governance</td>
<td>Arizona Geological Survey</td>
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<td>Chartas, George</td>
<td>PHYS</td>
<td>Extreme Velocity Quasar Outflows and the Role of X-Ray Shielding</td>
<td>Smithsonian Astrophysical Lab</td>
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<td>Congaree Park Moth Survey</td>
<td>Clemson</td>
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<td>Vance, Jason</td>
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<td>Year 2: ONR/MURI Subcontract: Flying Insect Sensory Modalities</td>
<td>University of Maryland</td>
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<td>UC-San Diego</td>
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<td>Energy Dependent X-Ray Microlensing</td>
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<td>BP America, Inc.</td>
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<td>Riggs-Gelasco, Pam</td>
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<td>Oxygen Activation by Metalloenzymes: Ribonucleotide Reductase from C. ammoniagenes and its facultative metal cofactor</td>
<td>Camille and Henry Dreyfus Foundation, Inc. Research Corporation for Science Advancement</td>
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<td>Bowring, Jim</td>
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<td>CIRDLES Yr 3: Development of Cyberstructure to Support Laser-Ablation ICP Mass Spectrometry--CIRCLES Year 3</td>
<td>ExxonMobil Upstream Research Company</td>
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<td>Beutel, Erin</td>
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<td>Name</td>
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<td>Monitoring Stream Flow in the Turkey Creek Watershed, Francis Marion National Forest, South Carolina</td>
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<td>Learn2Mine: An integrated learning environment to introduce high school and undergraduate students to data mining, CSCI, and data science</td>
<td>SC EPSCoR/IDEA Office</td>
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<td>SCaNearshore Intensive Survey (SCaNIS): Pilot Survey off Folly Beach</td>
<td>SC DNR Geological Division</td>
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<td>SC Sea Grant Consortium</td>
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<td>(RUI): Targeted Annotation and Exploration of Synteny of Immunoglobulin loci in Teleosts Using RSS Motifs</td>
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<td>Effects of Pharmaceutical Photodegradation Products in Freshwater on Local Amphibians</td>
<td>South Carolina Water Resources Center at Clemson University</td>
<td>2/28/2014</td>
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<td>Bowring, Jim</td>
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<td>Collaborative: Analytical techniques and software: Development of cyberinfrastructure to support laser-ablation ICP mass spectrometry</td>
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<td>Burnett, Lou</td>
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<td>Molecular Band Measurements of Absolute Starspot Properties</td>
<td>NSF</td>
<td>5/31/2014</td>
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<td>PHYS</td>
<td>Extrasolar Planet Imaging Studies with the Hubble and Spitzer Telescopes</td>
<td>University of South Florida</td>
<td>6/30/2014</td>
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<td>Ditullio, Jack</td>
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<td>Center for Integrated Modeling and Analysis of the Gulf Ecosystem (C-Image)</td>
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<td>Anderson, Paul</td>
<td>CSCI</td>
<td>GEAR: CI: Building Next Generation Bioinformatics Cyberinfrastructure for Genomics enabled Research and Education in the Charleston Scientific Community</td>
<td>SC EPSCoR/IDEA (housed @ USC)</td>
<td>6/30/2014</td>
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<td>NSF</td>
<td>07/31/2014</td>
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<td>Strand, Allan</td>
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<td>Genetic Risk Assessment Modeling for Offshore Marine Aquaculture Operations: Cobia</td>
<td>SC DNR</td>
<td>07/31/2014</td>
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<td>MATH</td>
<td>AF: Small: RUI: Ranking and Clustering by Integer and Linear Optimization</td>
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<td>Chartas, George</td>
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<td>The Energetics and Shielding of FeLoBAL Quasar Outflows</td>
<td>Chandra Observatory at Harvard University</td>
<td>12/31/2014</td>
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<td>Plante, Craig (Coles, David)</td>
<td>BIOL</td>
<td>SCUBA and video documentation of fish spawning at Gray's Reef National Marine Sanctuary</td>
<td>Lux Foundation American Chemical Society</td>
<td>12/31/2014</td>
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<td>Beam, Charles</td>
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<td>Murren, Courtney</td>
<td>BIOL</td>
<td>RUI: Integrating roots into whole plant phenotypes: ecological and genetic perturbations</td>
<td>NSF</td>
<td>2/28/2015</td>
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<td>Rutter, Matthew</td>
<td>BIOL</td>
<td>Collaborative: RUI: Engaging undergraduates in genomic questions and environmental context: building a database of complex phenotypes for plant</td>
<td>NSF</td>
<td>3/31/2015</td>
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<td>Runyon, Cassandra (Colgan, Mitchell)</td>
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<td>DiTullio, Jack</td>
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<td>NSF</td>
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<td>Neff, James</td>
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<td>NSF</td>
<td>7/31/2015</td>
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<td>Naylor, Gavin</td>
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<td>Collaborative Research: Jaws and Backbone: Chondrichthyan Phylogeny and a Spine for the Vertebrate Tree of Life</td>
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<td>Cory, Wendy</td>
<td>Chemistry &amp; Biochemistry</td>
<td>RUI: Photochemical Degradation, Soil Sorption, and Environmental Fate of Pharmaceutically active Compounds in Simulated and Natural Water Samples</td>
<td>National Science Foundation</td>
<td>8/31/2015</td>
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<td>Cory, Wendy</td>
<td>Chemistry &amp; Biochemistry</td>
<td>MRI: Acquisition of an Ultra High Pressure Liquid Chromatograph - Mass Spectrometer for Interdisciplinary Undergraduate Research and Teaching in Chemistry and Related Fields</td>
<td>National Science Foundation</td>
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<td>Fragile, Chris</td>
<td>PHYS</td>
<td>RUI: Numerical Simulations of Optically Thick Accretion onto Black Holes</td>
<td>NSF</td>
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<td>Larsen, Michael</td>
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<td>Collaborative Research: Characterization of the Two Dimensional/Temporal Mosaic of Drop Size Distributions and Spatial Variability (Structure) in Rain</td>
<td>National Science Foundation</td>
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<td>Chartas, George</td>
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<td>Energy Dependent X-Ray Microlensing and the Structure of Quasars</td>
<td>Chandra Observatory at Harvard University</td>
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<td>Stalvey, RoxAnn</td>
<td>CSCI</td>
<td>Year 2: Collaborative Research: Scaling up an innovative approach for attracting students to computing</td>
<td>NSF Howard Hughes Medical Institute (HHMI)</td>
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<td>Riggs-Gelasco, Pam</td>
<td>Chemistry</td>
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<td>NSF Howard Hughes Medical Institute (HHMI)</td>
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</table>
APPENDIX B: FACULTY PUBLICATIONS

Adem Ali


Paul Anderson


Iana Anguelova
Anguelova, I., Accepted 2014, Virasoro structures in the twisted vertex algebra of the particle correspondence of type C.

Anguelova, I., Cox, B., Jurisich, E., Accepted 2013, $N$-point locality for vertex operators: normal ordered products, operator product expansions, twisted vertex algebras.


Anguelova, I., Cox, B., Jurisich, E., 2013, Representations of $a_{\infty}$ and $d_{\infty}$ with central charge 1 on the single neutral fermion Fock space $\mathit{F^{\ten \frac{1}{2}}}$: INSTITUTE OF PHYSICS (IOP) PUBLISHING. v. 474. pp. 20.

Anguelova, I., Bergvelt, M., 2013, Quadratic differential operators, Bicharacters and bullet Products: COMMUNICATIONS IN ALGEBRA. v. 42, i.1, p. 389-416.
Agnes Ayme-Southgate


Tim Barker


Barbara Beckingham


Deborah Bidwell


David Boucher


APPENDIX B: FACULTY PUBLICATIONS

James Bowring
Bowring, J. F., (2013). Tripoli 4.7.5. (Charleston, SC: Cyber Infrastructure Research and Development Lab for the Earth Sciences (College of Charleston)).

Bowring, J. F., (2013). U-P_Redux 2.10.0. (Charleston, SC: Cyber Infrastructure Research and Development Lab for the Earth Sciences (College of Charleston)).

Louis Burnett


Johnson, JG, Kniffin, CD, Burnett, LE, Burnett, KG. High density, strand-specific RNA-seq analysis of the Pacific WhiteLeg Shrimp, Litopenaeus vannamei. INTEGRATIVE AND COMPARATIVE BIOLOGY 54 (Suppl. 1):E294.


Song, SM, Burnett, LE, Burnett, KG. 2014. Effects of hypoxia and sub-lethal bacterial injection
on critical oxygen pressures of penaeid shrimp. INTEGRATIVE AND COMPARATIVE BIOLOGY 54 (Suppl.1):E351.


Christine Byrum

Annalisa Calini

Calini, A., Schober, C., 2013, Observable and Reproducible Rogue Waves: JOURNAL OF OPTICS. v. 15, i. 10.

Tim Callahan


Jim Carew

Joseph Carson

Kuzuhara, M., Carson, J., 2013, Direct imaging of a cold jovian exoplanet in orbit around the sun-like star gj 504: ASTROPHYSICAL JOURNAL, v. 774, pp.11.

Hashimoto, J., Carson, J., 2013, Erratum: "polarimetric imaging of large cavity structures in the pre-transitional protoplanetary disk around pds 70: observations of the disk": ASTROPHYSICAL JOURNAL, v. 775, pp. 35.


John Chadwick

George Chartas


Andrew Clark
APPENDIX B: FACULTY PUBLICATIONS

**Ben Cox**

**Cox, B., Futorny, V., Misra. K., Accepted 2014, An imaginary PBW basis for quantum affine algebras of type 1.**

Anguelova, I., **Cox, B.**, Jurisich, E., Accepted 2013, $N$-point locality for vertex operators: normal ordered products, operator product expansions, twisted vertex algebras.

Jurisich, E., **Cox, B.**, Accepted 2013, REALIZATIONS OF THE THREE POINT LIE ALGEBRA $\text{sl}(2, \mathbb{R}) \oplus (\mathbb{R} \partial / \partial t)$: PACIFIC JOURNAL OF MATHEMATICS.

Anguelova, I., **Cox, B.**, Jurisich, E., 2013, Representations of $a_\infty$ and $d_\infty$ with central charge 1 on the single neutral fermion Fock space $\text{mathit{F^\ten \frac{1}{2}}}$: INSTITUTE OF PHYSICS (IOP) PUBLISHING. v. 474, pp. 20.

**Cox, B.,** Futorny, V., Juan, T., 2013, DJKM Algebras and Non-Classical Orthogonal Polynomials: JOURNAL OF DIFFERENTIAL EQUATIONS. v. 255, i.9, pp. 2846-2870.

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**Isaure deBuron**


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Giacoimo DiTullio


Jennifer Fox
Cui, T.Z.; Conte, A.; **Fox, J.L.**; Zara, V.; Winge, D.R. Journal of Biological Chemistry 2014, in print.

Patrick Fragile


Dexter, J., **Fragile, P.**, 2013, Tilted black hole accretion disc models of Sagittarius A*: time-variable millimetre to near-infrared emission: MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY.

Gamil Guirgis


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Jon Hakkila

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Scott Harris

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Willem Hillenius

Quick, D, Hillenius, WJ. 2013. Dinosaur physiology: were dinosaurs warm-blooded? In: ENCYCLOPEDIA OF LIFE SCIENCES (online)


Melissa Hughes

Thomas Ivey
Ivey, T., Ryan, P., 2013, Hypersurfaces in CP2 and HP2 with Two Distinct Principal Curvatures: GLASGOW MATHEMATICAL JOURNAL.

Renling Jin
Di Nasso, M., Goldbring, I., Jin, R., Leth, S., Lupini, M., Mahlburg, K., Accepted 2014, Progress on a sumset conjecture of erdős: CANADIAN JOURNAL OF MATHEMATICS.
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Martin Jones
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Elizabeth Jurisich
Anguelova, I., Cox, B., Jurisich, E., Accepted 2013, $SN$-point locality for vertex operators: normal ordered products, operator product expansions, twisted vertex algebras.
Jurisich, E., Cox, B., Accepted 2013, Realizations of the three point lie algebra $sl(2, \mathbb{R}) \oplus (\omega r/dr)$: PACIFIC JOURNAL OF MATHEMATICS.

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Bo Kai

Christopher Korey

Kristin Krantzman


Stephane Lafortune

Amy Langville
APPENDIX B: FACULTY PUBLICATIONS


Michael Larsen


Mark Lazzaro

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Brenton LeMesurier


Norman Levine


Jiexiang Li

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Associate Editor, "International Journal on Artificial Intelligence Tools." (December 1997 - December 2015).


Eric McElroy


Clyde Metz
Thomas, Alton R*.; Shuler, William G.*; Smith, Ellyn A.*; Carlisle, Sarah S.*; Knick, Shabree L*.; Puciaty, Metz, Clyde R.; VanDerveer, Donald G.; McMillen, Colin D.; Pennington, William T.; Beam, C. F., “Preparation and X-Ray Crystal Structure of (2Z,4E)-5-(4-substituted phenyl)-3-hydroxy-1-phenylpenta-2,4-dien-1-ones (Curcumin Analogs) from the Condensation-Elimination

Elizabeth Meyer-Bernstein

Garrett Mitchener
Mitchener, W., Accepted 2013, Evolution of communication protocols using an artificial regulatory network: ARTIFICIAL LIFE.


Courtney Murren


Gavin Naylor


Aspen Olmstead
APPENDIX B: FACULTY PUBLICATIONS

Sorinel Oprisan
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Jin-Hong Park
Park, J., Habtzghi, D., 2013, Estimation of Regression Model using a two stage nonparametric approach. v. 4, i. 8, p. 1189-1198.

Laura Penny
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Craig Plante

Robert Podolsky


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Verdolin, J, Schapiro, SJ, Podolsky, R, Marriott, BP. 2013. Use of discrete sleep sites by freeranging squirrel monkeys (Saimiri sciureus) in Sabana Seca, Puerto Rico. JOURNAL OF PRIMATOLOGY 75(S1):73

Seth Pritchard


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Andrew Przeworski

Pam Riggs-Gelasco

Amy Rogers
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Matthew Rutter
Gorka Sancho

Dinesh Sarvate
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Leslie Sautter

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Brian Scholtens

Andrew Shedlock

Erik Sotka


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Allan Strand


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Jeff Triblehorn


Jason Vance

Brooke Van Horn

Olsen, T. R., Davis, L. L.,* Nicolau, S. E.,* Duncan, C. C.,* Whitehead, D., Van Horn, B. A., Alexis,
APPENDIX B: FACULTY PUBLICATIONS


**Vijay Vulava**


**Allison Welch**

Turner SE; Brown JB; Ramirez JN; Cory, WC; **Welch, AM**. 2014. Acute and chronic effects of naproxen and its photodegradants on southern toad tadpoles. INTEGRATIVE AND COMPARATIVE BIOLOGY 54(Suppl.1):E360.

**Justin Wyatt**

**Paul Young**
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**Ana Zimmerman**

Hatful GF et al. (**Zimmerman AM**, phages Fishburne and Astro). 2013. Complete genome
sequences of 64 mycobacteriophages. GENOME ANNOUNCEMENTS 1 (DOI10.1128/genomceA.00847-13).
The following diversity activities took place in the School of Sciences and Mathematics since July 2013.

Summer 2013

- In Summer II, Dr. Dawne Taylor offered a section of Chem 103, a preparatory class for general chemistry, for the entering SCAMP/SPECTRA students. These URM students all enrolled in Chem 103 and Math 111 with Dr. Sophia Agrest. Most of these students then went on to enroll in a Biology/Calculus learning community. While the students in the Biology course, taught by Chris Korey, were a small cohort of a larger class, the students were enrolled in a special Bio 111 lab section where they participated in an inquiry-driven investigative lab. Students participated in the HHMI Phage program, where they identified unique phages in the environment and sequenced them. The SCAMP students scored an average GPA of 3.16 in their calculus class, vs. the average score of 2.31 for all other students in calculus.

- The Howard Hughes Medical Institute (HHMIK) grant on campus has incentivized and continues to incentivize faculty to seek URM students to participate in their research group by providing extra stipends for anyone seeking support for a URM student. The CofC HHMI program has not yet turned away an interested URM student. In Summer 2013, 21% (6) of our HHMI supported students were from underrepresented groups. Overall, since 2008, 18% of HHMI supported students were from underrepresented groups. Only 10% of the student population at CofC is from underrepresented groups. Of the 23 URM students that have been supported since 2008, 18 were supported with HHMI funds. Many of these students were supported for multiple years. The mentoring by SMS faculty in eth HHMI program seems to be particularly effective for URM students. Of the 13 URM graduates (most of whom were HHMI supported), 54% are in PhD programs (Georgia, University of Miami, University of Florida, University of South Carolina, and three at MUSC), 8% are in medical school (USC), and an additional 31% are still intending to apply to graduate programs.

- A new feature of the HHMI summer undergraduate research program was the addition of a high school student summer experience. CofC HHM collaborated with three area high schools, two that serve a high population of URM students (Stall High School and North Charleston High School) and the nationally ranked, highly competitive Academic Magnet High School. The AMHS students are required to write a senior thesis after a year-long research effort in the field of their choice. This year, through the efforts of Dr. Neal Tonks, CofC HHMI established a formal connection with AMHS to facilitate student participation in scientific research at an early age. The program was expanded to the other two area high schools after consultation with their principals. In our first year, nine (3 URM) students were recruited to participate in a six-week research project in 3 different departments. Though one student did not finish the program, the remaining students all participated in the end-of-summer research poster session.

Fall Semester 2013

- On October 15 approximately 1000 5th and 6th graders from Memminger, Mitchell, and James Simons Elementary Schools attended a workshop on The Frog Scientist.

- The College of Charleston has been selected to participate in the renewal of the statewide NIH-INBRE grant which has a major component of interfacing with the SCAMP program.

- On October 10 the SCAMP program held its annual research dinner featuring research presentations by undergraduate students.

- As part of its fall seminar series the Department of Chemistry & Biochemistry presented a video interview with Neal DeGrasse Tyson, the Frederick P. Rose Director of the Hayden Planetarium at the Rose Center for Earth and Space and a research associate in the department of astrophysics at the American Museum of Natural History.
Departments have begun faculty recruiting efforts and incorporating tactics to increase the number of minority applicants.

The SCAMP program was received a renewal grant from the National Science Foundation. Although the renewal was far less than what was previously received, SSM is making a major contribution of $7500 to the SCAMP budget to help shore up the difference.

Diversity is a topic at each semi-monthly department chairs meeting.

The Department of Chemistry & Biochemistry hired a tenure-track female analytical chemist.

The Department of Physics & Astronomy invited Dr. John O. Bello-Ogunu, Sr. was invited to one of the department meetings to discuss diversity.

The public astronomy open houses held the third Friday of each month generally attracted diverse populations from the Low Country.

The Department of Computer Science initiated a Women in Computing chapter.

Spring Semester 2014

The School of Sciences & Mathematics hosted approximately 100 students from Mitchell Elementary on January 9 and 10, 2014 to participate in a number of hands-on activities in biology, chemistry, & physics.

At the STEM Festival Kick-off at Liberty Square on Saturday February 8 the Lowcounty Hall of Science and various SSM faculty members sponsored numerous hands-on activities for the approximate 1500 participants, over 50% of who were female and around 20% of whom were underrepresented minorities.

Darwin Week, with a special Piccolo Darwin Week for local K-12 communities, was held in honor of Charles Darwin’s birthday, February 8-13. During the week, around 200 students attended lectures on evolutionary science.

On Saturday, February 22 the Math Department hosted its 38th annual Math Meet. Approximately 800 students and coaches from the tri-state area come to Charleston for a day of mathematics competition, culminating in an event hosted by the American Mathematical Society called "So you want to be a mathematician", and ending in an awards ceremony. The event is a celebration of exceptional talent and broad diversity. Every race, sex, ethnicity is highly represented.

On February 27 the second annual Education Day at the College of Charleston Women’s Basketball game featured S.T.E.M. activities presented by all of the departments of the School of Sciences & Mathematics, the School of Education, Health & Human Performance, and the Office of Sustainability, plus several non-CofC agencies. Approximately 1600 4th-8th graders and their teachers and chaperones attended. Over 40% of those attending were from underserved communities.

The Lowcountry Hall of Science and Math, in collaboration with the School of Education, Health, and Human Performance, presented a storytelling program, Teaching and Learning through Engaging Stories (TALES), at the National Afterschool Conference in New York, NY, February 28-March 3. The goal of TALES is to determine if the alternative instructional method of storytelling, related to science and engineering concepts, influences socioeconomically
disadvantaged students' learning, ultimately creating more science and math literate citizens. The team worked with students from two disadvantaged Title 1 schools in the district, Sanders Clyde and North Charleston Elementary.

- On April 1, the Departments of Chemistry & Biochemistry and Geology & Environmental Geosciences along with NASA Space Grant participated in a STEM hands-on activity night at Charleston Charter School for Math & Science. Approximately 200 students participated.

- On April 9, SSM Faculty and Staff participated in the first annual STEM activity day at the Charleston Riverdogs where approximately 5000 students, teachers, and chaperones were able to observe or participate in various STEM activities provided by all of our departments. Around 50% of the students attending were from Title 1 Schools, schools serving disadvantaged youth.

- The SSM Poster Session featured 112 posters, many from SCAMP, HHMI, or INBRE minority students.

- The following Excel awards were presented to members of SSM:
  - Wendy Cory (Chemistry & Biochemistry), SSM Outstanding Faculty Member
  - Chris Korey (Biology), Honors College Outstanding Faculty Member
  - SCAMP Student of the Year (Biology)- Amber Frazier
  - SSM Student of the Year (Biology)- Bethany Bowen

- HHMI and INBRE will be funding a number of minority students to participate in summer research projects with SSM faculty.

- The faculty hiring process in the Department of Physics and Astronomy this year included female and other minority candidates in the final on-campus interview.

- The departmental advisory committee in Physics & Astronomy was charged with the task of identifying ways to increase diversity within the department.

- Frequent faculty/staff/student discussions are held within the Department of Physics & Astronomy will be conducted to increase diversity awareness.

- Physics presentations and demonstrations were made at Haut Gap Middle School on John’s Island.

- Dr. Gavin Naylor of the Department of Biology has been working with a high school student from Academic Magnet High School during the 2013-14 school year. He has also lectured at on shark conservation at Ashley Hall School.

- Dr. Dave Owens of the Department of Biology gave two seminars this spring about our Graduate programs (Marine Biology, Computer Science, Math, Environmental Studies, Peace Corps PCMI) at South Carolina State University. The new Graduate School recruiting and Information specialist, Cicely McCray has made an intensive effort this past year at recruiting minority graduate students.

- Dr. Susan Morrison of the Department of Biology is the academic advisor for students participating in the PREP program for MUSC students. This program is designed to prepare applicants who are from underrepresented groups in medicine & dentistry and who are considered to have a good chance of success. They are selected from the pool of applicants to MUSC’s dental school or medical school. They spend one year at the College of Charleston taking primarily science courses, with funding coming from MUSC.
The Department of Computer Science will hold a Geek Squad outreach event June 13-14, 2014 for pre-college females that also includes many underrepresented racial and ethnic minorities.
College of Charleston

Academic Affairs

School of Sciences and Mathematics

School of Sciences and Mathematics

Program Name:

Program Type:

Start: 7/1/2013

End: 6/30/2014

Program Assessment Coordinator: Dean (Auerbach, Michael), Associate Dean (Deavor, James)

Administrative Unit Director receiving assessment updates: Provost/Exec VP of Acad Affair (Hynd, George)

Date of next program review:

Program/Department Mission Statement

Unit or School Mission
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.

Mission statement last reviewed October 11, 2013. Next review scheduled for October 2015.

Comments and Attachments


Program follows specialized accreditation standards: 

Name of accrediting organization:

Date of last program review for the accrediting organization:

Related Items
There are no related items.
1: Personalized Education

Program Goal or SLO
To provide students with a highly personalized education enhanced by opportunities to perform undergraduate research.

Assessment Method / Performance Expected
METHOD: The number of SSM majors participating annually in undergraduate research will be tracked.

PERFORMANCE EXPECTED: The number of students participating in undergraduate research experiences will increase.

Assessment Results
Academic Year, For Credit, Undergraduate Research Students by Semester, Fiscal Year, and Department

<table>
<thead>
<tr>
<th>DEPT</th>
<th>Fall 2012</th>
<th>Spring 2013</th>
<th>FY 2013</th>
<th>Fall 2013</th>
<th>Spring 2014</th>
<th>FY 2014</th>
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</thead>
<tbody>
<tr>
<td>BIOL</td>
<td>34</td>
<td>47</td>
<td>81</td>
<td>49</td>
<td>43</td>
<td>92</td>
</tr>
<tr>
<td>CHEM/BIOCHEM</td>
<td>25</td>
<td>25</td>
<td>49</td>
<td>44</td>
<td>26</td>
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<tr>
<td>CSCI</td>
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<td>16</td>
<td>10</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
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<td>21</td>
<td>22</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>MATH</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>PHYS/ASTRO</td>
<td>12</td>
<td>16</td>
<td>28</td>
<td>21</td>
<td>20</td>
<td>41</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>120</td>
<td>198</td>
<td>132</td>
<td>102</td>
<td>234</td>
</tr>
</tbody>
</table>

SSM Poster Session

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td># Posters</td>
<td>107</td>
<td>121</td>
</tr>
<tr>
<td># Students</td>
<td>210</td>
<td>237</td>
</tr>
</tbody>
</table>

Summer Research

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHMI</td>
<td>24.5</td>
<td>12</td>
</tr>
<tr>
<td>SURF</td>
<td>22</td>
<td>27</td>
</tr>
<tr>
<td>INBRE</td>
<td>8.5</td>
<td>10</td>
</tr>
<tr>
<td>Blalock</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Horatio Hughes</td>
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<td>NSF</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Research Corp</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>55</td>
<td>57</td>
</tr>
</tbody>
</table>

Use of Results
We continue to support a large number of students for summer research projects but many quality proposals are declined due to lack of funding through the URCA SURF program. External funding is sought but is
transitory and become ever harder to receive due to the high level of competition.

**Budget Changes**
Smaller institutions can require all students to participate in research program as a graduation requirement. Due to our size we could never do so due to space and faculty limitations. If we were to have ~2/3 of SSM faculty participate (100 out of ~145 faculty members), each mentoring two students each summer, at $6500 per students (includes supplies, student stipend, and token faculty stipend), that would require $1.3 million per year.

**Comments and Attachments**
- [Fall_2013_Students_Who_Took_Research_Courses JPD edits](#)
- [Spring_2014_Students_Who_Took_Research_Courses JPD edits](#)

**Related Items**

1: Enhance the undergraduate academic core.

---

**2: Instruction**

**Program Goal or SLO**
To provide students in general education courses with outstanding instruction provided by roster faculty members in the discipline.

**Assessment Method / Performance Expected**
ASSESSMENT METHOD: SSM will look at aggregate data from individual program assessments in the school and track the number of roster faculty teaching in these general education courses.

PERFORMANCE EXPECTED: Data will reveal which departments need additional resources to meet these demands.

**Assessment Results**
Below are data from the fall semester 2013 showing the number of sections taught by adjuncts and # of students vs. those taught by roster faculty in General Education courses in SSM. The raw data was supplied by Institutional Research.
CSCI does not currently offer courses that count towards the General Education requirement.

<table>
<thead>
<tr>
<th># Sections</th>
<th>% by Students</th>
<th>% by</th>
</tr>
</thead>
</table>
APPENDIX D: ASSESSMENT REPORT

<table>
<thead>
<tr>
<th>Adjunct</th>
<th>Roster</th>
<th>Total</th>
<th>roster</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL</td>
<td>14</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>CHEM</td>
<td>6</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>GEOL</td>
<td>3</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>HONS</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>MATH</td>
<td>40</td>
<td>36</td>
<td>76</td>
</tr>
<tr>
<td>PHYS</td>
<td>0</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>84</td>
<td>147</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adjunct</th>
<th>Roster</th>
<th>Total</th>
<th>roster</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL</td>
<td>781</td>
<td>586</td>
<td>1367</td>
</tr>
<tr>
<td>CHEM</td>
<td>266</td>
<td>363</td>
<td>629</td>
</tr>
<tr>
<td>GEOL</td>
<td>117</td>
<td>604</td>
<td>721</td>
</tr>
<tr>
<td>HONS</td>
<td>0</td>
<td>89</td>
<td>89</td>
</tr>
<tr>
<td>MATH</td>
<td>1528</td>
<td>1281</td>
<td>2809</td>
</tr>
<tr>
<td>PHYS</td>
<td>0</td>
<td>743</td>
<td>743</td>
</tr>
<tr>
<td>Total</td>
<td>2692</td>
<td>3666</td>
<td>6358</td>
</tr>
</tbody>
</table>

MATH had five faculty members on sabbatical and biology had one on sabbatical.

**Use of Results**
Results are used in making decisions when requesting for new faculty lines. BIOL, CHEM, and MATH have a historical record of having to use a large number of adjuncts to teach in their introductory/general education sequences. Competing interest for new lines includes the mandate to grow the CSCI program.

**Budget Changes**
To adequately address the imbalance in the three affected departments (BIOL, CHEM, and MATH) additional faculty would have to be hired. New tenure track faculty would require ~$60,000 each year in salary plus BIOL and CHEM would require and equal amount of start-up funding (one-time only). Providing adequate research space would be an important consideration. An alternative approach to meet this challenge would be the use of instructors.

**Comments and Attachments**
- [Fall 2013 teaching data, roster vs. non-roster](#)

**Related Items**

- 🔴 1: Enhance the undergraduate academic core.

---

3: Safety

**Program Goal or SLO**
To continually improve safety in laboratory and field experiences.

**Assessment Method / Performance Expected**
ASSESSMENT METHOD: Each of the four departments with laboratory programs will submit an annual report by May 15, 2014 addressing a
number of items.
PERFORMANCE EXPECTED: Each department will successfully complete at least 80% of the requested tasks.

Assessment Results
The Rita Hollings Science Center (RHSC) is being vacated for renovations. Thus we changed focus to studying the chemistry department. It met 100% of the goals. We will now work on the other three departments with laboratory programs.

Use of Results
The geology department and its geochemistry teaching and research programs will be the next area of focus building upon the results from the chemistry department.

Adjunct laboratory safety training needs to be enhanced.

Budget Changes
No budget changes are requested.

Comments and Attachments
With the exodus of BIOL and PHYS from RHSC and the move of GEOL to SSMB, we focused on the chemistry safety program. The hope is to make them the model department for the others to emulate as they move into new facilities.

- Chemistry safety report
- SSM Departmental Safety Committee Annual Report Template

Related Items

1: Enhance the undergraduate academic core.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
The School of Sciences and Mathematics ever strives to enhance the quality of instruction to our majors, to the general education populace, and to insure our laboratory work is safely carried out.

PROGRAM GOAL ONE: To provide students with a highly personalized education enhanced by opportunities to perform undergraduate research. We continue to support a large number of students for summer research
Many quality proposals are declined due to lack of funding through the CofC URCA SURF program. External funding is sought but is transitory and becomes ever harder to receive due to the high level of competition. Currently we have external support from HHMI, NIH, NSF, and the Research Corporation to fund undergraduate research students. Support via development opportunities will continue to be sought.

**PROGRAM GOAL TWO:** To provide students in general education courses with outstanding instruction provided by roster faculty members in the discipline.

We cannot decrease the percentage of student taught in introductory lecture courses by adjunct faculty without the addition of more roster faculty. BIOL has 57%, CHEM 42 %, and MATH 55% of intro students taught by adjuncts, (note that MATH also had 5 faculty members on sabbatical). We will continue to request additional instructional lines.

**PROGRAM GOAL THREE:** To continually improve safety in laboratory and field experiences.

The infusion of an active safety culture throughout our laboratory programs, both teaching and in research continues to improve. The Chemistry/Biochemistry and Geology Departments, now that they are in the same building are going to unite their efforts and have a single Safety Committee. Their successes will be used to model efforts in the other laboratory sciences.

**Related Items**

*There are no related items.*
Biology

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)

Related Items
There are no related items.
Biology - BA

Program Name: Biology
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Department Chair (Hillenius, Willem), Senior Instructor (Everett, Jean)
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael)
Date of next program review:

Program/Department Mission Statement
The role of the Department of Biology is to provide students with an understanding of the science of living systems within the context of a liberal arts education. The primary mission of the Department – as is true of the College – is excellence in undergraduate education; to this end, we continuously enhance and revise a curriculum that emphasizes scientific knowledge, theory and process across levels of biological organization and taxonomic diversity. Our goal is to prepare our majors for careers and/or post-graduate study in biology, and non-majors with an understanding and appreciation for the field of biology, as well as its relevance and application to modern life. In addition to this commitment to excellence in undergraduate education, the Department has a strong culture of valuing research; faculty members maintain active research programs, support two College of Charleston graduate programs, apply their expertise to local and regional issues, and publish in national and international journals.

Unit or School Mission
Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.

Comments and Attachments
1. The American Association for the Advancement of Science has developed a comprehensive review of undergraduate biology education, including an outline of the core concepts and competencies that should be the goal of an undergraduate program in the life sciences. We are using this as our guiding document when developing our assessment program. The full document can be accessed at the site linked below. The core concepts are all addressed in the first year of the foundation sequence, and most are
re-visited in the 2nd year. The core competencies are all addressed in the second year of the foundation sequence, but the 1st, 2nd, 3rd, 4th and 6th are also addressed in the first year.

Core Concepts, in brief:

1. Evolution
2. Structure and Function
3. Information Flow, Exchange, and Storage
4. Pathways and Transformations of Energy and Matter
5. Systems

Core Competencies, in brief:

1. Ability to Apply the Process of Science
2. Ability to Use Quantitative Reasoning
3. Ability to Use Modeling and Simulation
4. Ability to Tap Into the Interdisciplinary Nature of Science
5. Ability to Communicate and Collaborate With Other Disciplines
6. Ability to Understand the Relationship between Science and Society


2. This past academic year the Biology department voted to assess our foundation sequence and upper division program by administering the Biology Major Field Test (MFT) to 3 cohorts of students in every year assessed (assessment cycle as yet to be determined). We will assess incoming freshmen with a declared interest in the biology major in BIOL 111; biology majors at the end of the foundation sequence in BIOL 211; and graduating seniors. The MFT does not mirror the Core Concepts and Competencies summarized above, but does reflect and represent most of these Cores. Assessing all three cohorts in a single academic year rather than longitudinally will ensure that we use the same test form (it is changed periodically) with all cohorts.

Our goal is to generate randomly selected testing cohorts large enough to generate normal distributions. This will both better represent each overall cohort, and allow for secondary data analyses.

We administered the MFT to a random cohort of BIOL 111 students in August. We have not fully analyzed the results, but the average score was in the 3rd percentile. Our cohort average for graduating seniors this past May was in the 86th percentile.
The MFT reports the following scores:

Total Score
Sub-scores:
- Cell Biology
- Molecular Biology and Genetics
- Organismal Biology
- Population Biology, Evolution and Ecology

Assessment Indicators:
- Biochemistry and Cell Energetics
- Cellular Structure, Organization, Function
- Molecular Biology and Molecular Genetics
- Diversity of Organisms
- Organismal-Animals
- Organismal-Plants
- Population Genetics and Evolution
- Ecology
- Analytical Skills

In addition, the Biology Department purchased the Item Information Report, which allows a detailed analysis of the strengths and weaknesses of the program.

3. The first 2 years of our major requirements are the same for all students in the biology department. The differences between the BS, BS / Marine and the BA programs emerge after the 111-305 required sequence. These differences will be addressed as we develop our upper division assessment protocols. Our current plan is to have BS / Marine graduating seniors answer additional, locally generated questions on the MFT.

4. An expanded curriculum map was initiated this past academic year to encompass all undergraduate courses offered by the Biology Department. This is a work in progress, available upon request.

- BIOL BA-BS MBIO assessment-rubricwithcomments5.16.13

Program follows specialized accreditation standards: ☐
Name of accrediting organization: 
Date of last program review for the accrediting organization:

Related Items
There are no related items.
1: Core Concepts and Competencies - Foundation Sequence

**Program Goal or SLO**
At the end of the foundation sequence (BIOL 111, BIOL 112, BIOL 211) students demonstrate improvement in their understanding of the core concepts and competencies in biology.

**Assessment Method / Performance Expected**
Success is demonstrated by improved performance on the Biology Major Field Test (MFT) (see Program section) over the incoming first year class performance.

**Assessment Results**
This assessment has begun this academic year. We administered the MFT to a random cohort of students in BIOL 111. We have not fully analyzed the incoming BIOL 111 cohort, but the average score was in ~the 3rd percentile.

We assessed a random cohort from BIOL 211 at the end of the spring 2014 semester. We also have not fully analyzed this data, but the average score was in the 35th percentile, indicating a clear improvement over the incoming first year cohort.

**Use of Results**
The results of the MFT at the end of the foundation sequence, as compared to the results of the MFT at the beginning of the foundation sequence, will guide us in making changes, if necessary, in the way we teach the foundation sequence.

**Budget Changes**
No additional funds will be required - the assessment for the BS degree will include BA students, many of whom will not yet have decided on the BA vs. BS degree.

**Comments and Attachments**
**Related Items**
*There are no related items.*

2: Core Concepts and Competencies - Programmatic Maintenance

**Program Goal or SLO**
At the end of the program (BS, BA, BS Marine) students demonstrate maintained understanding of the core concepts and competencies in
biology.

**Assessment Method / Performance Expected**
Success is demonstrated by steady performance overall on the Biology MFT (see Program section) compared to performance at the end of the foundation sequence.

**Assessment Results**
See 3 and Program section.

We assessed a random cohort of graduating seniors in May 2014. We have not fully analyzed the data, but the cohort mean was in the 73rd percentile, indicating a clear improvement from the end of the foundation sequence (35th percentile). The national mean score for graduating seniors is at the 47th percentile. Keep in mind that the MFT is designed for graduating biology majors.

**Use of Results**
The department will use the results of the MFT to consider curricular changes.

**Budget Changes**
No additional funds will be required - the assessment for the BS degree will include BA students.

**Comments and Attachments**

**Related Items**
*There are no related items.*

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**3: Core Concepts and Competencies - Programmatic Improvement**

**Program Goal or SLO**
At the end of the program (BS, BA, BS Marine) students demonstrate improvement from the foundation sequence.

**Assessment Method / Performance Expected**
Success is demonstrated by improved group performance for some of the Assessment Indicators (see Program section) on the Biology MFT compared to the end of the foundation sequence.

**Assessment Results**
See also Program section.

We assessed a random cohort of graduating seniors in May 2014. We have not fully analyzed the data, but the cohort mean was in the 73rd
percentile, indicating a clear improvement from the end of the foundation sequence (35th percentile). The national mean score for graduating seniors is at the 47th percentile. Keep in mind that the MFT is designed for graduating biology majors.

**Use of Results**
The department will use the results of the MFT to consider curricular changes.

**Budget Changes**
No additional funds will be required - the assessment for the BS degree will include BA students.

**Comments and Attachments**

**Related Items**
*There are no related items.*

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4: Scientific Communication Skills

**Program Goal or SLO**
At the end of the program (BS, BA, BS Marine) students demonstrate the ability to understand standard scientific communication and to communicate their own work clearly and effectively using a variety of methods.

**Assessment Method / Performance Expected**
Success is demonstrated by acceptable oral and written reports evaluated by common departmental rubrics.

**Assessment Results**
This assessment was not administered this academic year.

**Use of Results**
The department will use the results of this assessment to consider curricular changes.

**Budget Changes**
A significant stipend may be required to support the additional faculty workload. This assessment may need to be handled separately for each of the degree programs.

**Comments and Attachments**

**Related Items**
*There are no related items.*
Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
We used the Biology Major Field Test (MFT) to assess incoming first year students, students at the end of the foundation sequence for majors (BIOL 111, 112 and 211) and graduating seniors. The MFT is designed to assess graduating seniors for their understanding of numerous concepts and competencies in biology and science. For more information, please see the Program section.

Our students showed a clear progression through the program with incoming students scoring at the 3rd percentile, 211 students scoring at the 35th percentile, and graduating seniors at the 73rd percentile. The national mean score is at the 47th percentile. The test is designed for graduating seniors, and only graduating seniors are included to determine the national mean score.

We feel confident that our program is quite successful, but will continue to analyze the test results to find and address areas where we can improve.

Related Items
There are no related items.
Biology - BS

Program Name: Biology
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Department Chair (Hillenius, Willem), Senior Instructor (Everett, Jean)
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael)
Date of next program review:

Program/Department Mission Statement
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4. Pathways and Transformations of Energy and Matter
5. Systems

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2. Ability to Use Quantitative Reasoning
3. Ability to Use Modeling and Simulation
4. Ability to Tap Into the Interdisciplinary Nature of Science
5. Ability to Communicate and Collaborate With Other Disciplines
6. Ability to Understand the Relationship between Science and Society


2. This past academic year the Biology department voted to assess our foundation sequence and upper division program by administering the Biology Major Field Test (MFT) to 3 cohorts of students in every year assessed (assessment cycle as yet to be determined). We will assess incoming freshmen with a declared interest in the biology major in BIOL 111; biology majors at the end of the foundation sequence in BIOL 211; and graduating seniors. The MFT does not mirror the Core Concepts and Competencies summarized above, but does reflect and represent most of these Cores. Assessing all three cohorts in a single academic year rather than longitudinally will ensure that we use the same test form (it is changed periodically) with all cohorts.

Our goal is to generate randomly selected testing cohorts large enough to generate normal distributions. This will both better represent each overall cohort, and allow for secondary data analyses.

We administered the MFT to a random cohort of BIOL 111 students in August. We have not fully analyzed the results, but the average score was in the 3rd percentile. Our cohort average for graduating seniors this past May was in the 86th percentile.
The MFT reports the following scores:

Total Score
Sub-scores:
• Cell Biology
• Molecular Biology and Genetics
• Organismal Biology
• Population Biology, Evolution and Ecology

Assessment Indicators:
• Biochemistry and Cell Energetics
• Cellular Structure, Organization, Function
• Molecular Biology and Molecular Genetics
• Diversity of Organisms
• Organismal-Animals
• Organismal-Plants
• Population Genetics and Evolution
• Ecology
• Analytical Skills

In addition, the Biology Department purchased the Item Information Report, which allows a detailed analysis of the strengths and weaknesses of the program.

3. The first 2 years of our major requirements are the same for all students in the biology department. The differences between the BS, BS / Marine and the BA programs emerge after the 111-305 required sequence. These differences will be addressed as we develop our upper division assessment protocols. Our current plan is to have BS / Marine graduating seniors answer additional, locally generated questions on the MFT.

4. An expanded curriculum map was initiated this past academic year to encompass all undergraduate courses offered by the Biology Department. This is a work in progress, available upon request.

- Associate Dean's Comments

Program follows specialized accreditation standards: ☐
Name of accrediting organization:
Date of last program review for the accrediting organization:
Related Items
There are no related items.
1: Core Concepts and Competencies - Foundation Sequence

Program Goal or SLO
At the end of the foundation sequence (BIOL 111, BIOL 112, BIOL 211) students demonstrate improvement in their understanding of the core concepts and competencies in biology.

Assessment Method / Performance Expected
Success is demonstrated by improved performance on the Biology Major Field Test (MFT) (see Program section) over the incoming first year class performance.

Assessment Results
This assessment has begun this academic year. We administered the MFT to a random cohort of students in BIOL 111. We have not fully analyzed the incoming BIOL 111 cohort, but the average score was in \( \sim 3^{rd} \) percentile.

We assessed a random cohort from BIOL 211 at the end of the spring 2014 semester. We also have not fully analyzed this data, but the average score was in the 35th percentile, indicating a clear improvement over the incoming first year cohort.

Use of Results
The results of the MFT at the end of the foundation sequence, as compared to the results of the MFT at the beginning of the foundation sequence, will guide us in making changes, if necessary, in the way we teach the foundation sequence.

Budget Changes
$6000 to administer the MFT to BIOL 111 cohort at the beginning of the Fall semester and BIOL 211 cohort at the end of the Fall semester, plus incentives to generate random cohorts that can also support secondary data analyses. This budget total includes administration to all 3 cohorts, including graduating seniors.

Comments and Attachments
Related Items
*There are no related items.*

2: Core Concepts and Competencies - Programmatic Maintenance

Program Goal or SLO
At the end of the program (BS, BA, BS Marine) students demonstrate maintained understanding of the core concepts and competencies in biology.

**Assessment Method / Performance Expected**
Success is demonstrated by steady performance overall on the Biology MFT (see Program section) compared to performance at the end of the foundation sequence.

**Assessment Results**
See 3 and Program section.

We assessed a random cohort of graduating seniors in May 2014. We have not fully analyzed the data, but the cohort mean was in the 73rd percentile, indicating a clear improvement from the end of the foundation sequence (35th percentile). The national mean score for graduating seniors is at the 47th percentile. Keep in mind that the MFT is designed for graduating biology majors.

**Use of Results**
The department will use the results of the MFT to consider curricular changes.

**Budget Changes**
$6000 to administer the MFT to BIOL 111 cohort at the beginning of the Fall semester, BIOL 211 cohort at the end of the Spring semester and the graduating senior cohort at the end of the Spring 2014 semester, plus incentives to generate random cohorts that can also support secondary data analyses.

**Comments and Attachments**
**Related Items**

1: Enhance the undergraduate academic core.

3: Develop and retain a highly qualified and diverse faculty and staff.

4: Recruit, enroll and retain an academically distinguished, well-prepared and diverse student body.
3: Core Concepts and Competencies - Programmatic Improvement

Program Goal or SLO
At the end of the program (BS, BA, BS Marine) students demonstrate improvement from the foundation sequence.

Assessment Method / Performance Expected
Success is demonstrated by improved group performance for some of the Assessment Indicators (see Program section) on the Biology MFT compared to the end of the foundation sequence.

Assessment Results
See also Program section.

We assessed a random cohort of graduating seniors in May 2014. We have not fully analyzed the data, but the cohort mean was in the 73rd percentile, indicating a clear improvement from the end of the foundation sequence (35th percentile). The national mean score for graduating seniors is at the 47th percentile. Keep in mind that the MFT is designed for graduating biology majors.

Use of Results
The department will use the results of the MFT to consider curricular changes.

Budget Changes
$6000 to administer the MFT to BIOL 111 cohort at the beginning of the Fall semester, BIOL 211 cohort at the end of the Fall semester and the graduating senior cohort at the end of the Spring 2014 semester, plus incentives to generate random cohorts that can also support secondary data analyses.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

3: Develop and retain a highly qualified and diverse faculty and staff.

4: Recruit, enroll and retain an academically distinguished, well-prepared and diverse student body.
4: Scientific Communication Skills

Program Goal or SLO
At the end of the program (BS, BA, BS Marine) students demonstrate the ability to understand standard scientific communication and to communicate their own work clearly and effectively using a variety of methods.

Assessment Method / Performance Expected
Success is demonstrated by acceptable oral and written reports evaluated by common departmental rubrics.

Assessment Results
This assessment was not administered this academic year.

Use of Results
The department will use the results of this assessment to consider curricular changes.

Budget Changes
A significant stipend may be required to support the additional faculty workload. This assessment may need to be handled separately for each of the degree programs.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

3: Develop and retain a highly qualified and diverse faculty and staff.

4: Recruit, enroll and retain an academically distinguished, well-prepared and diverse student body.
Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
We used the Biology Major Field Test (MFT) to assess incoming first year students, students at the end of the foundation sequence for majors (BIOL 111, 112 and 211) and graduating seniors. The MFT is designed to assess graduating seniors for their understanding of numerous concepts and competencies in biology and science. For more information, please see the Program section.

Our students showed a clear progression through the program with incoming students scoring at the 3rd percentile, 211 students scoring at the 35th percentile, and graduating seniors at the 73rd percentile. The national mean score is at the 47th percentile. The test is designed for graduating seniors, and only graduating seniors are included to determine the national mean score.

We feel confident that our program is quite successful, but will continue to analyze the test results to find and address areas where we can improve.

Related Items
There are no related items.
Biology - Minor

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)

Related Items
There are no related items.
Marine Biology - BS

Program/Department Mission Statement
The role of the Department of Biology is to provide students with an understanding of the science of living systems within the context of a liberal arts education. The primary mission of the Department – as is true of the College – is excellence in undergraduate education; to this end, we continuously enhance and revise a curriculum that emphasizes scientific knowledge, theory and process across levels of biological organization and taxonomic diversity. Our goal is to prepare our majors for careers and/or post-graduate study in biology, and non-majors with an understanding and appreciation for the field of biology, as well as its relevance and application to modern life. In addition to this commitment to excellence in undergraduate education, the Department has a strong culture of valuing research; faculty members maintain active research programs, support two College of Charleston graduate programs, apply their expertise to local and regional issues, and publish in national and international journals.

Unit or School Mission
Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.

Comments and Attachments
1. The American Association for the Advancement of Science has developed a comprehensive review of undergraduate biology education, including an outline of the core concepts and competencies that should be the goal of an undergraduate program in the life sciences. We are using this as our guiding document when developing our assessment program. The full document can be accessed at the site linked below. The core concepts are all addressed in the first year of the foundation sequence, and most are
re-visited in the 2nd year. The core competencies are all addressed in the second year of the foundation sequence, but the 1st, 2nd, 3rd, 4th and 6th are also addressed in the first year.

Core Concepts, in brief:

1. Evolution
2. Structure and Function
3. Information Flow, Exchange, and Storage
4. Pathways and Transformations of Energy and Matter
5. Systems

Core Competencies, in brief:

1. Ability to Apply the Process of Science
2. Ability to Use Quantitative Reasoning
3. Ability to Use Modeling and Simulation
4. Ability to Tap Into the Interdisciplinary Nature of Science
5. Ability to Communicate and Collaborate With Other Disciplines
6. Ability to Understand the Relationship between Science and Society


2. This past academic year the Biology department voted to assess our foundation sequence and upper division program by administering the Biology Major Field Test (MFT) to 3 cohorts of students in every year assessed (assessment cycle as yet to be determined). We will assess incoming freshmen with a declared interest in the biology major in BIOL 111; biology majors at the end of the foundation sequence in BIOL 211; and graduating seniors. The MFT does not mirror the Core Concepts and Competencies summarized above, but does reflect and represent most of these Cores. Assessing all three cohorts in a single academic year rather than longitudinally will ensure that we use the same test form (it is changed periodically) with all cohorts.

Our goal is to generate randomly selected testing cohorts large enough to generate normal distributions. This will both better represent each overall cohort, and allow for secondary data analyses.

We administered the MFT to a random cohort of BIOL 111 students in August. We have not fully analyzed the results, but the average score was in the 3rd percentile. Our cohort average for graduating seniors this past May was in the 86th percentile.
The MFT reports the following scores:

Total Score
Sub-scores:
• Cell Biology
• Molecular Biology and Genetics
• Organismal Biology
• Population Biology, Evolution and Ecology

Assessment Indicators:
• Biochemistry and Cell Energetics
• Cellular Structure, Organization, Function
• Molecular Biology and Molecular Genetics
• Diversity of Organisms
• Organismal-Animals
• Organismal-Plants
• Population Genetics and Evolution
• Ecology
• Analytical Skills

In addition, the Biology Department purchased the Item Information Report, which allows a detailed analysis of the strengths and weaknesses of the program.

3. The first 2 years of our major requirements are the same for all students in the biology department. The differences between the BS, BS / Marine and the BA programs emerge after the 111-305 required sequence. These differences will be addressed as we develop our upper division assessment protocols. Our current plan is to have BS / Marine graduating seniors answer additional, locally generated questions on the MFT.

4. An expanded curriculum map was initiated this past academic year to encompass all undergraduate courses offered by the Biology Department. This is a work in progress, available upon request.

• Associate Dean Comments and Rubric

Program follows specialized accreditation standards: □
Name of accrediting organization:
Date of last program review for the accrediting organization:
Related Items
There are no related items.
1: Core Concepts and Competencies - Foundation Sequence

Program Goal or SLO
At the end of the foundation sequence (BIOL 111, BIOL 112, BIOL 211) students demonstrate improvement in their understanding of the core concepts and competencies in biology.

Assessment Method / Performance Expected
Success is demonstrated by improved performance on the Biology Major Field Test (MFT) (see Program section) over the incoming first year class performance.

Assessment Results
This assessment has begun this academic year. We administered the MFT to a random cohort of students in BIOL 111. We have not fully analyzed the incoming BIOL 111 cohort, but the average score was in ~the 3rd percentile.

We assessed a random cohort from BIOL 211 at the end of the spring 2014 semester. We also have not fully analyzed this data, but the average score was in the 35th percentile, indicating a clear improvement over the incoming first year cohort.

Use of Results
The results of the MFT at the end of the foundation sequence, as compared to the results of the MFT at the beginning of the foundation sequence, will guide us in making changes, if necessary, in the way we teach the foundation sequence.

Budget Changes
No additional funds will be required - the assessment for the BS degree will include BS-Marine and BA students, many of whom will not yet have decided on the BA vs. BS vs. BS-Marine degree.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

3: Develop and retain a highly qualified and diverse faculty and staff.

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

2: Core Concepts and Competencies - Programmatic Maintenance

Program Goal or SLO
At the end of the program (BS, BA, BS Marine) students demonstrate maintained understanding of the core concepts and competencies in biology.

Assessment Method / Performance Expected
Success is demonstrated by steady performance overall on the Biology MFT (see Program section) compared to performance at the end of the foundation sequence.

Assessment Results
See 3 and Program section.

We assessed a random cohort of graduating seniors in May 2014. We have not fully analyzed the data, but the cohort mean was in the 73rd percentile, indicating a clear improvement from the end of the foundation sequence (35th percentile). The national mean score for graduating seniors is at the 47th percentile. Keep in mind that the MFT is designed for graduating biology majors.

Use of Results
The department will use the results of the MFT to consider curricular changes.

Budget Changes
No additional funds will be required - the assessment for the BS degree will include BA students.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

3: Develop and retain a highly qualified and diverse faculty and staff.
4: Recruit, enroll and retain an academically distinguished, well-prepared and diverse student body.

3: Core Concepts and Competencies - Programmatic Improvement

Program Goal or SLO
At the end of the program (BS, BA, BS Marine) students demonstrate improvement from the foundation sequence.

Assessment Method / Performance Expected
Success is demonstrated by improved group performance for some of the Assessment Indicators (see Program section) on the Biology MFT compared to the end of the foundation sequence. Additional, locally generated, questions will be added to the MFT to assess Marine Biology majors.

Assessment Results
See also Program section.

We assessed a random cohort of graduating seniors in May 2014. We have not fully analyzed the data, but the cohort mean was in the 73rd percentile, indicating a clear improvement from the end of the foundation sequence (35th percentile). The national mean score for graduating seniors is at the 47th percentile. Keep in mind that the MFT is designed for graduating biology majors.

Use of Results
The department will use the results of the MFT to consider curricular changes.

Budget Changes
No additional funds will be required - the assessment for the BS degree will include BS-Marine students.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.
3: Develop and retain a highly qualified and diverse faculty and staff.

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

4: Scientific Communication Skills

Program Goal or SLO
At the end of the program (BS, BA, BS Marine) students demonstrate the ability to understand standard scientific communication and to communicate their own work clearly and effectively using a variety of methods.

Assessment Method / Performance Expected
Success is demonstrated by acceptable oral and written reports evaluated by common departmental rubrics.

Assessment Results
This assessment was not administered this academic year.

Use of Results
The department will use the results of this assessment to consider curricular changes.

Budget Changes
A significant stipend may be required to support the additional faculty workload. This assessment may need to be handled separately for each of the degree programs.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

3: Develop and retain a highly qualified and diverse faculty and staff.
Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
We used the Biology Major Field Test (MFT) to assess incoming first year students, students at the end of the foundation sequence for majors (BIOL 111, 112 and 211) and graduating seniors. The MFT is designed to assess graduating seniors for their understanding of numerous concepts and competencies in biology and science. For more information, please see the Program section.

Our students showed a clear progression through the program with incoming students scoring at the 3rd percentile, 211 students scoring at the 35th percentile, and graduating seniors at the 73rd percentile. The national mean score is at the 47th percentile. The test is designed for graduating seniors, and only graduating seniors are included to determine the national mean score.

We feel confident that our program is quite successful, but will continue to analyze the test results to find and address areas where we can improve.

Related Items
There are no related items.
Marine Biology - MS

Marine Biology - MS

Program Name: Marine Biology
Program Type: Graduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Professor (Plante, Craig)
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael)
Date of next program review: 2013

Program/Department Mission Statement
The purpose of the Graduate Program in Marine Biology is to offer students a well-rounded, Master’s degree level of education in marine biology that will allow graduates to pursue further study or professional employment in marine science. The curriculum is designed to provide students with breadth in their education, while focused research projects develop depth.

Unit or School Mission
Biology Dept: The role of the Biology Department is to provide students with an understanding of the science of living systems within the context of a liberal arts education. The primary mission of the Department – as is true of the College – is excellence in undergraduate education; to this end, we continuously enhance and revise a curriculum that emphasizes scientific knowledge, theory and process across levels of biological organization and taxonomic diversity. Our goal is to prepare our majors for careers and/or post-graduate study in biology, and non-majors with an understanding and appreciation for the field of biology, as well as its relevance and application to modern life. In addition to this commitment to excellence in undergraduate education, the Department has a strong culture of valuing research; faculty members maintain active research programs, support two College of Charleston graduate programs, apply their expertise to local and regional issues, and publish in national and international journals.

Graduate School: The Graduate School of the College of Charleston seeks to offer graduate degrees and certificate programs that take advantage of the unique opportunities provided by the people, institutions, and environment of the South Carolina Low Country and that offer the specialized knowledge and training sought by professionals living and working in the region. The graduate programs provide a quality driven, student-oriented education in an atmosphere that encourages student and faculty diversity, inclusiveness, and equity.
Comments and Attachments
The program requirements for the GPMB are more advanced in academic content than undergraduate program in the same field. Major requirements fall under two categories:

1. Coursework

Content and rigor of coursework are in part set by the extensive set of pre-requisite courses for admission into the Program. These include: two courses of college physics, calculus, chemistry through organic (2 courses) or analytical, and 20+ semester hours of upper division biology courses, including a course in ecology and one in cell or molecular biology. These courses are designed to ensure that incoming students are prepared to immediately take our 4 core courses. Those students with abundant undergraduate or graduate coursework that overlaps with any of our core courses can opt out of those classes to avoid redundancy and replace them with elective courses. The GPMB has a Curriculum and Academic Planning (CAP) committee that consists of 8 GPMB faculty and one student representative. The committee is charged with reviewing the curriculum and recommending courses modifications. Ultimately, the rigor and relevance of the coursework, especially that of the “core” courses, is evaluated during the students’ oral comprehensive exams.

1. Research thesis

All students in the GPMB must conduct research and defend their project orally, and submit an approved written thesis. The thesis provides the clearest evidence that the Program is more complex and rigorous than marine biology undergraduate programs. Through the thesis research, students demonstrate not only the ability to gather broad knowledge in marine science and more specific knowledge in their specialty from coursework, but also to analyze and evaluate information from the literature and other sources, create new information with their own research, and, finally, to effectively communicate that information to other scientists. Both the oral defense and written thesis are evaluated by the student’s thesis committee, which consists of 4-5 members. The committee mainly consists of GPMB regular and adjunct faculty, with the option that one member can be non-faculty. Faculty consist of both regular (College of Charleston) and adjunct (non-CofC) faculty. Adjunct faculty are primarily affiliated with our Fort Johnson partners (NOAA, SC-DNR, HML, NIST, and MUSC).


Program follows specialized accreditation standards: □
Name of accrediting organization:
Date of last program review for the accrediting organization: 2007

Related Items
There are no related items.

1: Broad Knowledge

Program Goal or SLO
Acquire broad knowledge marine biology and related sciences. Program graduates obtain a strong foundation of knowledge of 1) the biology of marine organisms (across all levels of biological organization and taxonomic diversity), 2) the ocean environment, and 3) the practice of science. (See attached curriculum map)

Assessment Method / Performance Expected
All students are tested by their thesis committee and exam chair within 30 days of completing the core curriculum. At least 90% of students should average “good” (=3 on 1-5 scale) or better over all subject areas of the exam (see attached rubric).

Assessment Results
All sixteen students that entered the GPMB in the 2012-2013 academic year have completed the oral exam. Thirteen of 16 (81%) averaged > 3.0 ("good" on the 1-5 scale) on their first attempt at the exam. Two students failed the exam but both were granted a re-take opportunity. One of those students dropped out of the GPMB, whereas the other passed her re-take exam. Using the final (re-take) scores, 14 of 16 (88%) averaged > 3.0 for the five areas of assessment. (Fourteen of the 15 remaining students (93%) exceeded the 3.0 threshold.) The mean composite score was 3.65, ranging between 2.04 - 4.96. This mean was up slightly from last year’s average (3.55). Mean scores for each area of assessment (General Biology, Ecology, Sub-organismal Biology, Oceanography, and Statistics & Experimental Design) were all above 3 (3.60-3.71). The oral comprehensive exams for the 2013 class are currently underway. Of the 16 new students, 9 have taken and passed the exam. Five of 9 have averaged above 3.0 in each area of assessment. The remaining 7 students are scheduled to take the exam in June or early July 2014.

Use of Results
Because mean scores for each area of assessment (General Biology, Ecology, Sub-organismal Biology, Oceanography, and Statistics & Experimental Design) were all above 3 and showed little variation
(3.60-3.71 with mean of 3.65), there is little indication of a weakness in a specific area of instruction. The goal of "At least 90% of students should average 'good' or better over all subject areas of the exam" was just missed (88%) or slightly exceeded (93%), depending on whether the scores of the single student leaving the program are used in the calculation.

To date, these results have been reviewed by the Program Director and the GPMB Admin Coordinator. The results will also be presented to the Marine Biology Council, the steering body of the GPMB, for discussion. This discussion is planned for July 2014, after we have compiled the results for a third year class of students. At that meeting, the Council will consider 1) if the standard should be raised or if another area of study for improvement should be instead used for assessment, and 2) whether/how the results should be communicated to the entire GPMB faculty and student body.

**Budget Changes**
None

**Comments and Attachments**

- Curriculum map

- Rubric (Oral Comprehensive Exam)

**Related Items**

2: Develop nationally recognized graduate programs.

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

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.
2: Communication

Program Goal or SLO
Demonstrate ability to clearly and effectively communicate scientific results. New knowledge acquired through the scientific process has little meaning without effective communication to other scientists, resource managers and other decision-makers, and the public. (See attached curriculum map)

Assessment Method / Performance Expected
Students present their proposed research and their early research results in the form of a scientific poster and oral presentation, resp., at our annual GPMB student research colloquium. All students should present at least one each poster and talk while in the program. The Colloquium is an annual event, occurring each Fall. At least 90% of students should average a "good" (= 4 on 1-6 scale) or better score over all areas of assessment (see attached rubrics for poster and talks). Two separate panels of judges, mostly derived from GPMB regular or adjunct faculty, will score the posters and oral presentations.

Assessment Results
Beginning second- and third-year GPMB students presented their research in scientific posters and oral presentations, respectively, at our annual student research colloquium on September 20-21, 2013. Seventeen of 17 (100%) of students presenting posters achieved a composite (average of 10 areas of assessment on content or presentation style; see scoring rubric) > 4.0. Composite scores of individual students ranged between 4.36-5.40. Mean scores of all students for the various areas of assessment ranged between 4.33 ("Results or Expected Results") to 5.60 ("Clarity of Verbal Presentation").

N.B.: One judge used the old scoring form (with 1-5 vs. 1-6 scale), necessitating re-scaling of his scores. This adjustment may have affected absolute scores slightly.

Fourteen of 14 (100%) of students presenting talks also obtained a composite (average of 10 areas of assessment on content or presentation style; see scoring rubric) > 4.0. Composite scores of individual students ranged between 4.35-5.22. Mean scores of all students for the various areas of assessment ranged between 4.45 ("Content-Significance") and 5.17 ("Style-Visual Aids").

Use of Results
To date, these results have been reviewed by the Program Director and the GPMB Admin Coordinator. At this time no deficiencies in the area of scientific communication are apparent. Students and alumni of the GPMB are widely known to possess superior communication abilities, so these results confirmed our expectations. However, part of the training in scientific communication, particularly in constructing posters, is currently provided in the first-year seminar course, Biology
APPENDIX D: ASSESSMENT REPORT

621. This seminar has recently been reviewed by the GPMB's Curriculum and Academic Planning committee, and has been identified for possible deletion from the curriculum. If this comes to pass, it will be important to closely monitor the students' performance in poster presentations in the coming years and compare to the 2012-2013 results. These results will also be presented to the Marine Biology Council, the steering body of the GPMB, likely at our July 2014 meeting. Given the positive results of the first two assessments of this goal, we will discuss whether the expectations should be elevated or whether new assessment areas should be substituted. It is anticipated that these results will also be communicated to the entire GPMB faculty at our fall faculty meeting (late September or early October), and to the student body if the Marine Biology Council votes to disseminate to the students.

Budget Changes
None

Comments and Attachments

- Oral Evaluation form (1-6)
- Poster Evaluation Form (1-6)

Related Items

2: Develop nationally recognized graduate programs.

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

8: Collaborate with local, national and international institutions to leverage higher education for a stronger South Carolina.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.
3: Research Thesis

Program Goal or SLO
All students must conduct a marine biology research project, and orally defend their work and submit a written thesis. Both steps must be approved by their thesis committee. Publication in the peer-reviewed literature is one measure of the quality of the thesis research. Students in the program should conduct important and novel research, striving to contribute to the foundation of knowledge through publication in peer-reviewed journals.

Assessment Method / Performance Expected
Seventy-five percent (75%) of program graduates should publish their thesis research findings in peer-reviewed journals within three years of graduation.

Assessment Results
Due to the long time course of this objective (3 years post-graduation), results are not expected until 2016. However, to gauge whether our 75% publication goal was a reasonable expectation, we gathered comparative data from the last two GPMB cohorts (2009 and 2010 graduates) to have the full three-year period to publish thesis work. Of the 12 students graduating in 2009, only 4 (33%) published their thesis results in peer-reviewed journals. Eight of 16 (50%) of 2010 graduates published their research in the primary literature.

We also polled other M.S. programs in related fields (marine biology, fisheries/oceanography, and marine science) for comparative purposes. Unfortunately, very few other programs monitor the frequency of students publishing their thesis work. Of 68 programs contacted, only 3 responded and provided reliable data. Of these 3 programs, the percentages publishing in peer-reviewed journals were 35% (U. of Southern Mississippi-Marine Biology), 41% (Nicholls State University-Marine Biology), and 56% (U. of Southern Mississippi-Marine Science). Another 9 programs stated that they didn't actually track but provided estimates. These estimates ranged between 20 and 80%; however, it is likely that such guesses overestimate actual publication frequencies.

Use of Results
To date, these results have been reviewed by the Program Director and the GPMB Admin Coordinator. The results will also be presented to the Marine Biology Council, the steering body of the GPMB, for discussion. This discussion is planned for July 2014. At that meeting,
the Council will consider 1) if the standard of 75% publishing in peer-reviewed journals within 3 years of graduation is too ambitious, and 2) whether/how the results should be communicated to the entire GPMB faculty and student body. To reiterate, real data to address this new goal (as of Fall 2013) will not be available until 2016.

Budget Changes
None

Comments and Attachments
Related Items

2: Develop nationally recognized graduate programs.

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

8: Collaborate with local, national and international institutions to leverage higher education for a stronger South Carolina.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
Three areas of assessment are currently utilized: 1) broad knowledge (in marine biology, the ocean environment, and the practice of science), 2) scientific communication, and 3) publication of thesis research in the peer-reviewed scientific literature.

Assessments from the past two years indicate that performance in
broad knowledge (assessed through oral comprehensive exams) is at or just below targets. We have and continue to use this assessment and our Curriculum and Academic Planning committee reviews of the related coursework to identify weaknesses and recommend improvements.

Assessment of scientific communication skills through poster and oral presentation of research at our annual GPMB Student Research Colloquium indicate that students are performing very well in this area and have exceeded target thresholds. The program director and steering committee will evaluate whether this threshold should be raised or whether this goal should be replaced with another area of assessment.

Thesis publication as a assessment tool is a new addition (as of Fall 2013) so no data yet exist. The goal is a 75% publication rate within 3 years of graduation, therefore first data are expected in 2016.

**Related Items**

*There are no related items.*
Chemistry and Biochemistry

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)

Related Items
There are no related items.
Biochemistry - BS

Biochemistry- BS

Program Name: Biochemistry
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Department Chair (Riggs-Gelasco, Pam)

Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)

Date of next program review: We are required to report graduate data and program information annually to ACS

Program/Department Mission Statement
Learning in the Department of Chemistry and Biochemistry occurs in a supportive yet challenging environment where students benefit from a talented, accomplished faculty and staff, state-of-the-art facilities, hands-on use of modern instrumentation and a culture that emphasizes experiential learning and development through participation in faculty mentored research. In all of our actions we strive to improve our students’ critical thinking skills, content based knowledge, and an appreciation for the scientific method and ethical expectations of scientists.

Unit or School Mission
“Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.”
For a more expansive discussion please see http://ssm.cofc.edu/about-the-school/.

Comments and Attachments

- Associate Dean Comments and Completed Rubric
- BS Biochemistry Curriculum Map

Program follows specialized accreditation standards: ✔️
Name of accrediting organization: American Chemical Society Certification
Date of last program review for the accrediting organization: Currently undergoing 5-year review
Related Items
1: Proficiency in Chemistry

Program Goal or SLO
The BS Biochemistry major will demonstrate proficiency in the broader discipline of Chemistry.

Assessment Method / Performance Expected
Educational Testing Service Major Field Test in Chemistry which is administered each spring as part of the required Senior Seminar capstone in the major, CHEM 492. CHEM 492 must be taken the spring semester immediately preceding graduation. We expect that, on average, our students will score at or above the 50% percentile on this instrument in terms of their overall score.

Assessment Results
The average percentile ranking for the 28 exiting seniors is 66th percentile on the MFT; the median is 70th percentile. The range was 28-99th percentile. Five of the 29 did not meet the benchmark. The lowest student did not make it through the program, indicating that the external benchmark and internal benchmarks (grades) are in alignment. Students closer to the 50th percentile cutoff will make it through the program.

Of the Biochemistry indicator questions on the MFT, the mean percent correct was 59%, but this included all majors, chemistry and biochemistry. Looking at individual biochemistry-related questions, on 75% of the questions, our students (Chem and Biochem) collectively outscored national scores.

Use of Results
At a departmental retreat, the most missed question topics were discussed.

Budget Changes
We are hoping that Academic Affairs or Assessment office will pay the annual $750 fee for access to the advanced data analysis features of the MFT site. Multiple departments are using MFT tests and all of us will have access to these features.

Comments and Attachments
Related Items
1: Enhance the undergraduate academic core.

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

2: Proficiency in Sub-discipline

Program Goal or SLO
The BS Biochemistry major will demonstrate proficiency in one or more of the more narrowly defined sub-disciplines of Chemistry, which include Analytical, Biochemistry, Inorganic, Organic, or Physical chemistry.

Assessment Method / Performance Expected
METHOD: Educational Testing Service Major Field Test in Chemistry which is administered each spring as part of the required Senior Seminar capstone in the major, CHEM 492. CHEM 492 must be taken the spring semester immediately preceding graduation.

PERFORMANCE EXPECTED: Students score at or above the 60% percentile on this instrument in terms of their score on at least one of the sub-disciplinary test areas.

Assessment Results
Five students did not achieve a 60th percentile ranking in one of the four sub-committees

Use of Results
The department discussed the most missed question topics.

Budget Changes
We are hoping that Academic Affairs or Assessment office will pay the annual $750 fee for access to the advanced data analysis features of the MFT site. Multiple departments are using MFT tests and all of us will have access to these features.

Comments and Attachments
- Item Analysis 2014 MFT
Related Items

1: Enhance the undergraduate academic core.

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

3: Positive Appreciation

Program Goal or SLO
The BS Biochemistry major will demonstrate a positive appreciation for the educational experiences received within our department.

Assessment Method / Performance Expected
Senior survey administered as part of the CHEM 492 course (>70% rate strongly agree to question: “Your experience in the department has served you well in preparation for your anticipated career goals” & “My overall opinion of the Department of Chemistry and Biochemistry is that it is an excellent department”) and senior survey administered by the College of Charleston should reflect high satisfaction with the major (>70% in College’s exit senior survey in the area of overall academic experience and program of study).

Assessment Results
18/23 (78%) of graduating seniors strongly agree to this question.

In addition, for over 4 years we have carefully monitored and discussed student comments in this extensive survey. Students demanded more biochemistry electives, better math training, and an elimination of some of the biology courses.

Use of Results
The department reviews in detail the comments and results of the senior survey each year. This past year we made extensive changes in the curriculum primarily based on student comments in the survey for the past 5 years.

Budget Changes

Comments and Attachments
Even though the new math class has not yet been offered, this year's graduating class commented extensively about their excitement of the
new math class tailored towards the chemistry major. They provided a lot of positive reinforcement that we have made a good decision.

Also, many of our current biochemistry majors are opting to change catalogs for the new requirements, providing more positive reinforcement that the students think the changes are an improvement on the curriculum.

- Curriculum cover letter

Related Items

1: Enhance the undergraduate academic core.

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

4: Career Goals

Program Goal or SLO
BS Biochem majors achieve success in attaining career goals, especially in health related areas.

Assessment Method / Performance Expected
The department will track student career intentions prior to leaving campus by using iBiosketch, required exit surveys, Facebook, and LinkedIn. Our hope is that 75% of students desiring to stay in science will successfully be matriculated in a graduate program or will be successfully employed.

Assessment Results
87% of graduates from Class of 2010 and Class of 2011 are either employed in science or are in graduate school for the sciences (med, dental, pharmacy, PhD, masters, nursing, etc.). Out of 77 students, all but one were updated through email, Facebook, linked in or through web searches.

For 2013-14 admits to medical schools and dental schools, 12% of the full time (non-post bac) admits were from Chemistry and Biochemistry---most were biochemistry majors. Another 3 students
Use of Results
Through reaching out to these students, several who are not satisfied with their situation have reconnected with the department to help get back on track towards pursuing their post-graduation goals.

This data will be useful in advertising the department to perspective students and perspective majors and may help attract better students to the College.

Budget Changes
We are hoping that Academic Affairs or Assessment office will pay the annual $750 fee for access to the advanced data analysis features of the MFT site. Multiple departments are using MFT tests and all of us will have access to these features.

Comments and Attachments

- 2010 and 2011 Employment Data

Related Items

1: Enhance the undergraduate academic core.

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

5: Research Opportunities

Program Goal or SLO
The majority of BS Biochemistry majors participate in research opportunities as a capstone experience.

Assessment Method / Performance Expected
We will track research participation by requiring mandatory safety training in all research courses and for summer research participation. We will catch outside research experiences via our required senior survey. We will assess if research participation ends in successful career outcomes based on student goals using
iBiosketch, surveys, and communication with faculty working with students.

**Assessment Results**

Ninety percent of the students who went on to pursue a PhD had conducted undergraduate research in the Chemistry and Biochemistry Department at the College of Charleston.

93% of the 2013-2014 Biochemistry students conducted research at CofC.

**Use of Results**

Faculty are motivated to maximize student involvement in their labs. This includes participation in a freshmen research rotation to lure students to research earlier.

**Budget Changes**

We are hoping that Academic Affairs or Assessment office will pay the annual $750 fee for access to the advanced data analysis features of the MFT site. Multiple departments are using MFT tests and all of us will have access to these features.

**Comments and Attachments**

**Related Items**

1: Enhance the undergraduate academic core.

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

5: Enhance co-curricular and extracurricular programs for the holistic education of students.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.
Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
Based on results to four years of senior surveys, the department discussed and then voted to approve changes to the degree path for the BS in Biochemistry. Students were demanding more chemistry based courses and better math preparation for physical chemistry. The changes were approved by the curriculum committee and the faculty senate and go into effect the 2014-15 school year. 80% of our BS biochemistry majors this year participated in research at the College and now this research will count towards the degree. These experiences prepare students well for matriculation in medical and dental school programs and in PhD programs. 90% of our students who have matriculated in a PhD program over the past 12 years carried out research at the College. In a survey of our 2010 and 2011 graduates, 87% of our alumni are employed in science or are enrolled in a discipline specific graduate program.

Related Items
There are no related items.
Chemistry - BA

Chemistry - BA
Program Name: Chemistry
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Department Chair (Riggs-Gelasco, Pam)
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
Date of next program review: 2017

Program/Department Mission Statement
Learning in the Department of Chemistry and Biochemistry occurs in a supportive yet challenging environment where students benefit from a talented, accomplished faculty and staff, state-of-the-art facilities, hands-on use of modern instrumentation and a culture that emphasizes experiential learning and development through participation in faculty mentored research. In all of our actions we strive to improve our students’ critical thinking skills, content based knowledge, and an appreciation for the scientific method and ethical expectations of scientists.

Unit or School Mission
“Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.”
For a more expansive discussion please see http://ssm.cofc.edu/about-the-school/.

Comments and Attachments

- Associate Dean Comments and Completed Rubric
- Curriculum Map BA Chemistry

Program follows specialized accreditation standards: ✔
Name of accrediting organization: American Chemical Society
Date of last program review for the accrediting organization: 2011
Related Items
1: Proficiency in Broad Discipline

Program Goal or SLO
The BA Chemistry major will demonstrate proficiency in the broad discipline of Chemistry.

Assessment Method / Performance Expected
Educational Testing Service Major Field Test in Chemistry which is administered each spring as part of the required Senior Seminar capstone in the major, CHEM 492. CHEM 492 must be taken the spring semester immediately preceding graduation. We expect that, on average, our students will score at or above the 50% percentile on this instrument in terms of their overall score.

Assessment Results
The average percentile ranking for the 28 exiting seniors is 66th percentile on the MFT; the median is 70th percentile. The range was 28-99th percentile. Five of the 29 did not meet the benchmark. The lowest student did not make it through the program, indicating that the external benchmark and internal benchmarks (grades) are in alignment. Students closer to the 50th percentile cutoff will make it through the program.

Use of Results
At a departmental retreat, the most missed question topics were discussed. Individual faculty members are aware of the most missed topics.

Budget Changes
We are hoping that Academic Affairs or Assessment office will pay the annual $750 fee for access to the advanced data analysis features of the MFT site. Multiple departments are using MFT tests and all of us will have access to these features.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.
4: Recruit, enroll and retain an academically distinguished, well-prepared and diverse student body.

2: Proficiency in Sub-discipline

Program Goal or SLO
The BA Chemistry major will demonstrate proficiency in one or more of the more narrowly defined sub-disciplines of Chemistry, which include Analytical, Biochemistry, Inorganic, Organic, or Physical chemistry.

Assessment Method / Performance Expected
Educational Testing Service Major Field Test in Chemistry which is administered each spring as part of the required Senior Seminar capstone in the major, CHEM 492. CHEM 492 must be taken the spring semester immediately preceding graduation. We expect that, on average, our students will score at or above the 60% percentile on this instrument in terms of their score on at least one of the sub-disciplinary test areas.

Assessment Results
Five students total did not achieve a 60th percentile ranking in one of the four sub-committees. One of these students was a BA chemistry major.

Use of Results
The department discussed the most missed question topics. Individual professors could then modify course content for better understanding of the material.

Budget Changes

Comments and Attachments

- Item Analysis 2014 MFT

Related Items

1: Enhance the undergraduate academic core.
APPENDIX D: ASSESSMENT REPORT

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

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3: Positive Appreciation

Program Goal or SLO
The BA Chemistry major will demonstrate a positive appreciation for the educational experiences received within our department.

Assessment Method / Performance Expected
Senior survey administered as part of the CHEM 492 course (>70% rate strongly agree to question: “Your experience in the department has served you well in preparation for your anticipated career goals” & “My overall opinion of the Department of Chemistry and Biochemistry is that it is an excellent department”) and senior survey administered by the College of Charleston should reflect high satisfaction with the major (>70% in College’s exit senior survey in the area of overall academic experience and program of study).

Assessment Results
18/23 (78%) of graduating seniors strongly agree to this question. We do not have a method of separating out BA chemists responses from the others.

Use of Results
The department reviews in detail the comments and results of the senior survey each year. This past year we made extensive changes in the curriculum primarily based on student comments in the survey for the past 5 years.

Budget Changes

Comments and Attachments

- Curriculum cover letter

Related Items

1: Enhance the undergraduate academic core.

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

4: Graduate Career

Program Goal or SLO
BA Chem majors achieve success in attaining career goals

Assessment Method / Performance Expected
The department will track student career intentions prior to leaving campus by using iBiosketch, required exit surveys, Facebook, and LinkedIn. Our hope is that 75% of students desiring to stay in science will successfully be matriculated in a graduate program or will be successfully employed.

Assessment Results
87% of graduates from Class of 2010 and Class of 2011 are either employed in science or are in graduate school for the sciences (med, dental, pharmacy, PhD, masters, nursing, etc.). Out of 77 students, all but one were updated through email, Facebook, linked in or through web searches. We are unable to look up student records to determine which were BA and which were BS chemistry majors.

For 2013-14 admits to medical schools and dental schools, 12% of the full time (non-post bac) admits were from Chemistry and Biochemistry---most were biochemistry majors. Another 3 students are currently applying.

Use of Results
Through reaching out to these students, several who are not satisfied with their situation have reconnected with the department to help get back on track towards pursuing their post-graduation goals.

This information will be a useful recruiting tool for incoming students.

Budget Changes

Comments and Attachments
It would be helpful if we could view transcripts for students on MyCharleston for several years after they graduate. I cannot see if our 2010-2011 graduates received BAs or BSs on the system to see if there is any correlation.

Related Items

1: Enhance the undergraduate academic core.
4: Recruit, enroll and retain an academically distinguished, well-prepared and diverse student body.

5: Research Engagement

Program Goal or SLO
The majority of BA Chemistry majors participate in research opportunities as a capstone experience.

Assessment Method / Performance Expected
We will track research participation by requiring mandatory safety training in all research courses and for summer research participation. We will catch outside research experiences via our required senior survey. We will assess if research participation ends in successful career outcomes based on student goals using iBiosketch, surveys, and communication with faculty working with students.

Assessment Results
Ninety percent of the students who went on to pursue a PhD had conducted undergraduate research in the Chemistry and Biochemistry Department at the College of Charleston.

We only had two BA only students this term. Neither did research in the department or at CofC. Both are planning careers in science, though one student is in danger of not achieving the 2.0 minimum GPA.

Use of Results
NA

Budget Changes
No budget changes are requested.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

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

5: Enhance co-curricular and extracurricular programs for the holistic education of students.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
Based on results to four years of senior surveys, the department discussed and then voted to approve changes to the degree path for the BA in Chemistry. Students were demanding better math preparation for physical chemistry. The changes were approved by the curriculum committee and the faculty senate and go into effect the 2014-15 school year. In a survey of our 2010 and 2011 graduates, 87% of our alumni are employed in science or are enrolled in a discipline specific graduate program.

Related Items
There are no related items.
Chemistry - BS

Chemistry - BS

**Program Name:** Chemistry  
**Program Type:** Undergraduate Degree  
**Start:** 7/1/2013  
**End:** 6/30/2014  
**Program Assessment Coordinator:** Department Chair (Riggs-Gelasco, Pam)  
**Administrative Unit Director receiving assessment updates:** Dean (Auerbach, Michael), Associate Dean (Deavor, James)  
**Date of next program review:** We are required to report graduate data and program information annually to ACS

**Program/Department Mission Statement**
Learning in the Department of Chemistry and Biochemistry occurs in a supportive yet challenging environment where students benefit from a talented, accomplished faculty and staff, state-of-the-art facilities, hands-on use of modern instrumentation and a culture that emphasizes experiential learning and development through participation in faculty mentored research. In all of our actions we strive to improve our students’ critical thinking skills, content based knowledge, and an appreciation for the scientific method and ethical expectations of scientists.

**Unit or School Mission**
“Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.”
For a more expansive discussion please see http://ssm.cofc.edu/about-the-school/.

**Comments and Attachments**
Other ongoing assessment: We are testing whether a 1-2-1 sequence will be a viable option for improving student performance in organic and for retaining students. In this sequence, students take their first semester of organic their freshmen year. We are testing this on Honors students. In our first semester of “freshmen organic”, the freshmen honors students outperformed other Honors students taking their first semester of organic on the same common final. This is the first key comparison before we consider adopting the model for all students.

- Associate Dean Comments and Completed Rubric
Program follows specialized accreditation standards:  ✔
Name of accrediting organization:  American Chemical Society Certification
Date of last program review for the accrediting organization:  Currently undergoing 5-year review
Related Items
There are no related items.

1: Proficiency in Broad Discipline

Program Goal or SLO
The BS Chemistry major will demonstrate proficiency in the broad discipline of Chemistry.

Assessment Method / Performance Expected
Educational Testing Service Major Field Test in Chemistry which is administered each spring as part of the required Senior Seminar capstone in the major, CHEM 492. CHEM 492 must be taken the spring semester immediately preceding graduation. We expect that, on average, our students will score at or above the 50% percentile on this instrument in terms of their overall score.

Assessment Results
The average percentile ranking for the 28 exiting seniors is 66th percentile on the MFT; the median is 70th percentile. The range was 28-99th percentile. Five of the 29 did not meet the benchmark. The lowest student did not make it through the program, indicating that the external benchmark and internal benchmarks (grades) are in alignment. Students closer to the 50th percentile cutoff will make it through the program.

Use of Results
At a departmental retreat, the most missed question topics were discussed.

Budget Changes
No budget changes are required.

Comments and Attachments
Related Items
1: Enhance the undergraduate academic core.

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

2: Proficiency in Sub-discipline

Program Goal or SLO
The BS Chemistry major will demonstrate proficiency in one or more of the more narrowly defined sub-disciplines of Chemistry, which include Analytical, Biochemistry, Inorganic, Organic, or Physical chemistry.

Assessment Method / Performance Expected
Educational Testing Service Major Field Test in Chemistry which is administered each spring as part of the required Senior Seminar capstone in the major, CHEM 492. CHEM 492 must be taken the spring semester immediately preceding graduation. We expect that, on average, our students will score at or above the 60% percentile on this instrument in terms of their score on at least one of the sub-disciplinary test areas.

Assessment Results
Five students did not achieve a 60th percentile ranking in one of the four sub-tests.

Use of Results
The department discussed the most missed question topics.

Budget Changes
No budget changes are required.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

4: Recruit, enroll and retain an academically distinguished, well-prepared and diverse student body.
3: Positive Appreciation

Program Goal or SLO
The BS Chemistry major will demonstrate a positive appreciation for the educational experiences received within our department.

Assessment Method / Performance Expected
Senior survey administered as part of the CHEM 492 course (>70% rate strongly agree to question: “Your experience in the department has served you well in preparation for your anticipated career goals” & “My overall opinion of the Department of Chemistry and Biochemistry is that it is an excellent department”) and senior survey administered by the College of Charleston should reflect high satisfaction with the major (>70% in College’s exit senior survey in the area of overall academic experience and program of study).

Assessment Results
18/23 (78%) of graduating seniors strongly agree to this question.

In addition, for over 4 years we have carefully monitored and discussed student comments in this extensive survey. Students demanded better math training in preparation for physical chemistry. In the past, there were complaints about the physical chemistry lab and a reorganization of this course has all but eliminated these types of comments.

Use of Results
The department reviews in detail the comments and results of the senior survey each year. This past year we made extensive changes in the curriculum primarily based on student comments in the survey for the past 5 years.

Budget Changes
No budget changes are required.

Comments and Attachments
Even though the new math class has not yet been offered, this year's graduating class commented extensively about their excitement of the new math class tailored towards the chemistry major. They provided a lot of positive reinforcement that we have made a good decision.
Related Items

1: Enhance the undergraduate academic core.

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

4: Career Goals

Program Goal or SLO
BS Chemistry majors achieve success in attaining career goals

Assessment Method / Performance Expected
The department will track student career intentions prior to leaving campus by using iBiosketch, required exit surveys, Facebook, and LinkedIn. Our hope is that 75% of students desiring to stay in science will successfully be matriculated in a graduate program or will be successfully employed.

Assessment Results
87% of graduates from Class of 2010 and Class of 2011 are either employed in science or are in graduate school for the sciences (med, dental, pharmacy, PhD, masters, nursing, etc.). Out of 77 students, all but one were updated through email, Facebook, linked in or through web searches. For 2013-14 admits to medical schools and dental schools, 12% of the full time (non-post bac) admits were from Chemistry and Biochemistry---most were biochemistry majors. Another 3 students are currently applying.

Use of Results
Through reaching out to these students, several who are not satisfied with their situation have reconnected with the department to help get back on track towards pursuing their post-graduation goals.

This data will be useful in advertising the department to perspective students and perspective majors and may help attract better students to the College.

Budget Changes
No budget changes are required.

Comments and Attachments
Class of 2010 and 2011 Alumni Job Placement

Related Items

1: Enhance the undergraduate academic core.

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

5: Research Opportunities

Program Goal or SLO
The majority of BS Chemistry majors participate in research opportunities as a capstone experience.

Assessment Method / Performance Expected
We will track research participation by requiring mandatory safety training in all research courses and for summer research participation. We will catch outside research experiences via our required senior survey. We will assess if research participation ends in successful career outcomes based on student goals using iBiosketch, surveys, and communication with faculty working with students.

Assessment Results
Ninety percent of the students who went on to pursue a PhD had conducted undergraduate research in the Chemistry and Biochemistry Department at the College of Charleston.

57% of the 2013-2014 Biochemistry students conducted research at CoC. NOTE: Only the BS chemists who participated in research have employment or school lined up for next year. The three out of seven BS Chemist graduates who did not do research do not have definitive plans for next year.

Use of Results
Faculty are motivated to maximize student involvement in their labs. This includes participation in a freshmen research rotation to lure students to research earlier.
Budget Changes
No budget changes are required.

Comments and Attachments

Related Items

1: Enhance the undergraduate academic core.

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

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
Based on results to four years of senior surveys, the department discussed and then voted to approve changes to the degree path for the BS in Chemistry. Students were demanding better math preparation for physical chemistry. The changes were approved by the curriculum committee and the faculty senate and go into effect the 2014-15 school year. 57% of our BS chemistry majors this year participated in research at the College. These experiences prepare students well for matriculation in medical and dental school programs and in PhD programs. 90% of our students who have matriculated in a PhD program over the past 12 years carried out research at the College. In a survey of our 2010 and 2011 graduates, 87% of our alumni are employed in science or are enrolled in a discipline specific graduate program. All of the BS Chemistry 2014 graduates who participated in research have a job or school plans for the coming fall.

Related Items
There are no related items.
Chemistry - Minor

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
Chemistry minors tend to be Biology majors, many of whom are in the molecular biology concentration. This year's graduating Chem minors who are biology majors had an average GPA of 3.5.

Related Items
There are no related items.
Computer Science

Computer and Information Sciences - MS

Program Name: Computer and Information Sciences
Program Type: Graduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Department Chair (Starr, Christopher), Professor (McCauley, Renee)
Administrative Unit Director receiving assessment updates: Associate Dean (Deavor, James)
Date of next program review:

Program/Department Mission Statement
The primary mission of the Computer Science Department is teaching undergraduate and graduate students of the College of Charleston. The Department provides students with the necessary conceptual tools for life-long learning through exposure to well-designed curricula, research and co-curricular experiences. These curricula merge strong theoretical foundations with current methodologies and tools.

The Department actively supports faculty development in teaching and scholarship. This allows Computer Science faculty to stay current in and contribute to the discipline, and to incorporate state-of-the-art advances into the classroom and curricula.

The secondary mission of the Computer Science Department is service to campus, community, international activities, and faculty.

Unit or School Mission
Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.”
For a more expansive discussion please see http://ssm.cofc.edu/about-the-school/.

Comments and Attachments
Program follows specialized accreditation standards: □
Name of accrediting organization:
Date of last program review for the accrediting organization:
Related Items
There are no related items.
Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)

Related Items
There are no related items.
Computational Thinking - Minor

Computational Thinking Minor

Program Name: Computational Thinking Minor
Program Type: Other
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Administrative Unit Director receiving assessment updates:
Date of next program review:

Program/Department Mission Statement

Unit or School Mission

Comments and Attachments

- Associate Dean Comments and Completed Rubric

Program follows specialized accreditation standards: ☐
Name of accrediting organization:
Date of last program review for the accrediting organization:

Related Items

There are no related items.

1: Define Computing Requirements

Program Goal or SLO
An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

Assessment Method / Performance Expected

Assessment Question
Given the following problem, identify the best set of computing requirements for the problem.
A client runs a local pet store. The client would like to keep track of the customers who have shared their email address and send an email to them on a monthly basis.
The computing requirements appropriate to a solution is best described as:
A) a database on a server
B) a mobile app interface or web app interface
C) a microcontroller for actuating a lever  
D) A and B  
E) A, B and C 

**Rubric** 
First year (CSCI 220): 50% will select the correct answer of D.  
Middle years (CSCI 230): 70% will select the correct answer of D.  
Senior year (CSCI 462): 90% will select the correct answer of D. 

**Assessment Results** 

**Use of Results** 

**Budget Changes** 

**Comments and Attachments** 

**Related Items**

1: Enhance the undergraduate academic core. 

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2: Design, Implement, and Evaluate 

**Program Goal or SLO** 
An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs 

**Assessment Method / Performance Expected** 

**Assessment Question** 
Evaluate the code meant to sum the integers from 1 to 10. Which solution below, that uses a loop, produces the correct result? Assume sum is initialized to 0. 
A) for (int i=1; i<=10; i++) sum=sum-i; 
B) for (int i=0; i<10; i++) sum=sum+(i+1); 
C) for (int i=1; i>0; i--) sum=sum+i; 
D) for (int i=10; i>1; i--) sum=sum+i; 
E) sum=10*11/2; 

**Rubric** 
First year (CSCI 220): 50% will select the correct answer of B.  
Middle years (CSCI 230): 70% will select the correct answer of B.  
Senior year (CSCI 462): 90% will select the correct answer of B.
3: Techniques, Skills, and Tools

Program Goal or SLO
An ability to use current techniques, skills, and tools necessary for computing practices.

Assessment Method / Performance Expected

Assessment Question
Check the software development tools that you have successfully used in developing software solutions so far in your undergraduate degree coursework.
A) BlueJay
B) Eclipse
C) Netbeans
D) Idle
E) Notepad/textpad
F) TextWrangler

Rubric
First year (CSCI 220): 90% will have used at least one in the list above
Middle years (CSCI 230): 90% will have used at least two in the list above
Senior year (CSCI 462): 90% will have used at least three in the list above

Assessment Results
Use of Results
Budget Changes
Comments and Attachments
Related Items
Related Items

1: Enhance the undergraduate academic core.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
Assessment and Evaluation
May 2014
Program: Minor Computational Thinking by Chris Starr

Program Goal 1. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

Assessment Question
Given the following problem, identify the best set of computing requirements for the problem.

A client runs a local pet store. The client would like to keep track of the customers who have shared their email address and send an email to them on a monthly basis.

The computing requirements appropriate to a solution is best described as:
A) a database on a server
B) a mobile app interface or web app interface
C) a microcontroller for actuating a lever
D) A and B
E) A, B and C

Rubric
First year (CSCI 220): 50% will select the correct answer of D.
Middle years (CSCI 230): 70% will select the correct answer of D.
Senior year (CSCI 462): 90% will select the correct answer of D.

Results
First year:
Problem 1: 50% got the problem correct. The goal was 50%. The students responding met this goal, but just did so.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:
Problem 1: 47% got the problem correct. The goal was 90%. The students responding did not meet the goal.

**Evaluation**
A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

**Program Goal 2. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs**

**Assessment Question**
Evaluate the code meant to sum the integers from 1 to 10. Which solution below, that uses a loop, produces the correct result? Assume sum is initialized to 0.

A) for (int i=1; i<=10; i++) sum=sum-i;
B) for (int i=0; i<10; i++) sum=sum+(i+1);
C) for (int i=1; i>0; i--) sum=sum+i;
D) for (int i=10; i>1; i--) sum=sum+i;
E) sum=10*11/2;

**Rubric**
First year (CSCI 220): 50% will select the correct answer of B.
Middle years (CSCI 230): 70% will select the correct answer of B.
Senior year (CSCI 462): 90% will select the correct answer of B.

**Results**
First year:
Problem 2: 65% got the problem correct. The goal was 50%. The students responding met this goal, but just did so.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:
Problem 2: 67% got the problem correct. The goal was 90%. The students responding did not meet the goal.

**Evaluation**
The first year students met this goal, but the senior students responding did not meet the goal. A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.
Program Goal 3. An ability to use current techniques, skills, and tools necessary for computing practices.

Assessment Question
Check the software development tools that you have successfully used in developing software solutions so far in your undergraduate degree coursework.

A) BlueJay
B) Eclipse
C) Netbeans
D) Idle
E) Notepad/textpad
F) TextWrangler

Rubric
First year (CSCI 220): 90% will have used at least one in the list above
Middle years (CSCI 230): 90% will have used at least two in the list above
Senior year (CSCI 462): 90% will have used at least three in the list above

Results
First year:
Problem 3: 100% of 26 students reported use of one or more development environments. The goal was 90%. The students responding met this goal.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:
Problem 3: 86% of the students reported use of three or more development environments. The goal was 90%.

Evaluation
The first year students met this goal, but the senior students responding did not meet the goal. A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

Related Items
There are no related items.
Computer Information Sciences - MS

Program Information for Computer and Information Sciences

Program Name: Computer and Information Sciences
Program Type: Graduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Associate Professor (Leclerc, Anthony)
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael)
Date of next program review:

Program/Department Mission Statement

Goals
To meet the needs of the local community for master’s level education in the computing disciplines.

Objectives
The program objectives are:

1. To give each student a solid foundation in core courses appropriate for a program with several specializations.
   - Students will complete courses in data modeling, object-oriented design patterns, software engineering, and distributed computer systems architecture.

2. To build on the core to provide depth in an area of specialization appropriate for a professional graduate degree and compatible with local needs.
   - Students will complete 12 hours of course work in one of three specialization areas: computer science, information systems, or software engineering.

3. To provide the students with the opportunity to integrate their course work, or to broaden it, as they feel it best benefits them.
   - Students can integrate their coursework via a research or project thesis, or broaden their background through additional course work.

4. To assess the extent to which the program is serving the needs of the community.
   - Establish a Computer Science Advisory Board for the department comprised of representatives from business, industry, government, and universities with graduate programs in computer science, for exchanging ideas and to soliciting advice for strengthening the effectiveness of the programs, especially as they relate to meeting the needs of the community.

5. To use a survey of recent graduates to help assess the extent to
which their graduate education helped meet their professional needs.

6. To develop closer ties with the graduate programs at other universities in the State.

   - Examine the graduate curricula of other institutions in the State and look for areas where our graduate curricula are similar to others.
   - Explore the possibility of CofC students who take courses in other programs, apply them to their CofC graduate CSIS degree, and to discuss with other institutions the possibility of them allowing their students to do the same with our courses.

Unit or School Mission
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.

Comments and Attachments

- Associate Dean Comments and Completed Rubric
- Map Course and Program Outcomes MS

Program follows specialized accreditation standards: ☐
Name of accrediting organization: SACS
Date of last program review for the accrediting organization:

Related Items
There are no related items.

1: Competency in Core Areas

Program Goal or SLO
1. Acquire competency in core areas appropriate for a program
APPENDIX D: ASSESSMENT REPORT

with several specialization tracks.

1. Students will demonstrate an advanced level of knowledge and ability in using software development models and techniques.

2. Students will demonstrate the ability to critically analyze research in the computer science literature.

3. Learning Outcome (new, added for 2012 year)

   Students will demonstrate the ability to function effectively on teams to accomplish a common goal.

**Assessment Method / Performance Expected**

1.1 Students will complete a substantial software development project consisting of multiple deliverables covering both planning and execution. Each deliverable is evaluated individually according to the Graduate College grading scale below, and a composite project grade is given based on the average overall grades for deliverables.

   - A : High Quality Work
   - B+: Above Average Quality Work
   - B : Average Graduate Accomplishments
   - C+: Below Average Graduate Work
   - C : Unsatisfactory
   - F : Minimum Requirements Not Met

1.2 Students will be required to produce papers analyzing research articles and deliver a presentation on their views. Papers are graded subjectively based on content and mechanics according to the Graduate College scale:

   - A : High Quality Work
   - B+: Above Average Quality Work
   - B : Average Graduate Accomplishments
   - C+: Below Average Graduate Work
   - C : Unsatisfactory
   - F : Minimum Requirements Not Met

In 2011, informal presentations throughout the semester were graded subjectively on the above scale by the instructor. In 2012, formal presentations were graded by the instructor and by peers based on the following questions, which were scored on a 1 to 10 scale. These scores were translated into the above letter grades.

Q1: The speaker seemed well prepared
Q2: Slides and/or visual aids enhanced the presentation and the
communication of key ideas
Q3: The speaker engaged me as an audience member and held my attention
Q4: The speaker respected me and others by staying within the request time limits
Q5: I was convinced that the speaker invested significant time developing his or her research
Q6: The speaker had a balance of reporting the facts with putting forward his or her own ideas

1.3
Students will be required to complete a substantial semester project as a member of a team.

**Assessment Results**

**Students Evaluated:** 8

**Findings for Software Development Project**

**Summary of Findings:** (2013)

In 2012 we changed from individual projects to team projects and saw improvements. In 2013 this team project approach with individuals contributing change requests to a shared project repository was again put into practice. Functional, documented code was again observed in greater amounts than with individual projects of 2011. Project grades continued at an A average. Students were more engaged in the process and work was more evenly distributed over the semester. Project scope did not seem to be an issue in 2013 like it was in 2012.

**Results:** Acceptable Target Achievement (short term goal): Exceeded;
Ideal Target Achievement (long term goal): Exceeded

1.2
Findings for Paper & Presentation Analysis of Research Article

**Summary of Findings:** (2013)

Writing grades were improved to an A- average. Presentations had an increased professionalism and a B- average. Only 10% of students achieved an A on both the written portion and presentation portion.

**Results:** Acceptable Target Achievement (short term goal): Met;
Ideal Target Achievement (long term goal): Not met

1.3
Findings for Team Project

**Summary of Findings:** (2013)

The project structure from 2012 was maintained. Each team member was responsible for documenting and implementing one change request and integrating it into a shared project using a version control system. Teams choose which team members did which features, so
lower skilled students could pick simpler ones. As a result, grades maintained an A average, work was evenly distributed over the whole semester, documentation was created before code as intended, and student enjoyment of the projects was observed. Unlike the 2011 semester and like the 2012 semester, the project scopes again were not diminished to make up for poor planning. However, due to the lack of a teaching assistant and based on 2012 experience, the ideal project length of three phases was reduced to two phases. Peer assessments on team skills were collected after each phase.

**Results:** Acceptable Target Achievement (short term goal): Met; Ideal Target Achievement (long term goal): Exceeded

### Use of Results

1.1 Recommendations for Continuous Improvement: To insure quality, only one open-source project was provided. It would be better to allow students to select a project of their choice/interest.

1.2 Recommendations for Continuous Improvement: To improve further, students will be shown more examples of proper presentation skills ahead of time. Proper examples and resources for writing will continue to be given to maintain the progress gained there.

1.3 Recommendations for Continuous Improvement: To improve further, a two phase plan will be maintained instead of the three phase plan. Additionally, an updated peer assessment form will be investigated in order to obtain more useful feedback.

### Budget Changes

No budget changes are required.

### Comments and Attachments

1.1 Reflections/Notes: A set of 12 high-quality open source projects curated by other instructors of similar courses has been acquired, along with detailed build instructions. If vetted, these projects can allow a greater variety of project choices for students while avoiding the overwhelming task of identifying projects of suitable quality and scope from the Internet.

1.2 Reflections/Notes: The presentation component was graded a bit more strictly than in 2012. This will be continued, but students will be better trained to give a better presentation.

1.3 Reflections/Notes: This Learning Objective was added after 2011 in response to poor results observed in individual student projects. Results were poor for many students who lacked fresh programming
skills and projects were forced and scrambled at the end of the semester.

Related Items

2: Develop nationally recognized graduate programs.

8: Collaborate with local, national and international institutions to leverage higher education for a stronger South Carolina.

2: Area of Specialization

**Program Goal or SLO**
Acquire advance knowledge in an area of specialization appropriate for a professional degree:

1. Computer Science Specialization (Assessed in CSIS 618)
   1. Understand the **programming models** underlying different languages, and make informed design choices in languages supporting multiple complementary approaches.
   2. Identify the **Chomsky Hierarchy** and relate the various levels to both formal and programming language concepts as well as limits of computation.
2. Information Systems Specialization (Assessed in CSIS 631 and 632)
   1. Students will be able to design and implement client/server network applications using BSD sockets API.
   2. Students will be able to analyze different cryptographic techniques.
3. Software Engineering Specialization (Assessed in CSIS 656)
   1. Students will demonstrate an ability to evaluate alternative designs according to principles of good architecture and design.
   2. Students will demonstrate an ability to work as a team to engineer working software.

Assessment Method / Performance Expected
Computer Science Specialization (Assessed in CSIS 618)
1. Understand the **programming models** underlying different languages, and make informed design choices in languages supporting multiple complementary approaches:

**Method:**

The following paradigms were studied: imperative (procedural, scripting, and object-oriented) and declarative (logic and functional). Students completed several programming assignments on each paradigm and presented on several languages. For example the presentation included a procedural, OO, functional and scripting where the students must present the following:

Discuss the reasons for the language and specifically problems the language attempts to solve.
→ How well did the language solve the problems?
→ Discuss the benefits and drawbacks of each major abstraction/characteristic the language presents. → Support your argument with code examples.
→ Is the language Procedural, OO, Function, and/or Logic?
→ What type of binding does the language employ?
→ What is the language's type system (Strong vs. Dynamic)?
→ Does the language utilize references or pointers?
→ Is the language mainly compiled or interpreted?
→ Does the language support garbage collection?
→ How readable is the language (opinion)?
→ How portable is the language?
→ Brevity: Are "complex" tasks completed in a small amount of code?
→ Does the language support error checking?
→ How modular is the language?
→ How well does the language support concurrency?
→ Discuss how the abstractions/characteristic presented by the language impede and/or enable satisfactory performance. Be sure to discuss whether any performance penalties for language abstractions represent worthwhile trade-offs.
→ Discuss how well the language supports large programming projects involving multiple developers (What development tools are available?)

Students were expected to support their answer to each claim with a code example.

Additionally for logic programming the following question appeared on the final:
Consider the following Prolog:
edge(a, b). edge(g, c). edge(c, d).
edge(b, c). edge(d, e). edge(f, g).
path(X, Y):- edge(Z, Y), path(X, Z).
path(X, X).

Provide the backtracking for the following query:
path(X, e).

**Grading Scale:**
A : High Quality Work
B+: Above Average Quality Work
B : Average Graduate Accomplishments
C+: Below Average Graduate Work
C : Unsatisfactory
F : Minimum Requirements Not Met

**Performance Expected:** A median grade of 'B' on the aggregate, unweighted mean of these four assignments.

2. Identify the Chomsky Hierarchy and relate the various levels to both formal and programming language concepts as well as limits of computation:

**Method:**
The Chomsky Hierarchy was studied in relation to formal and programming language concepts only, with an emphasis on programming language translation. This made sense as about half of the course materials related to program definition and translation and implementation of various translation components. The following questions appear on the final:

a) Write a grammar for the language = \{a^n b^n, n >1\} (In other words a sequence of a's followed by a sequence of b's where the number of a's = the number of b's.) Where does this grammar fall in the Chomsky Hierarchy?

b) Write a grammar for language composed of a, b, c, where the number of a's = number of b's = number of c's ({a, b, c}^*), #a = #b = #c. Where is Chomsky Hierarchy is your grammar?

c) Why do most programming language designers try to be context-free instead of context-sensitive?

**Grading Scale:**
A : High Quality Work
B+: Above Average Quality Work
B : Average Graduate Accomplishments
C+: Below Average Graduate Work
C : Unsatisfactory
F : Minimum Requirements Not Met

**Performance Expected:** A median grade of B on the aggregate, unweighted mean of these three final exam questions.
CSIS 632)
1. Students will be able to design and implement client/server network applications using BSD sockets API.

Measure: Programming Project
Details/Description: Programming projects are assigned. Students are required to submit source files and script files with sample runs.

Grading Scale:
A : High Quality Work
B+: Above Average Quality Work
B : Average Graduate Accomplishments
C+: Below Average Graduate Work
C : Unsatisfactory
F : Minimum Requirements Not Met

Acceptable Target (shortterm goal): 80% of the class will score 80% or higher in the programming projects.
Ideal Target (longterm goal): Average score will be B or better on programming projects

2. Students will be able to analyze different cryptographic techniques.

CSCI 631 not offered FY14

Software Engineering Specialization (Assessed in CSIS 656)
1. Students will demonstrate an ability to evaluate alternative designs according to principles of good architecture and design

Measure: Team Project
Details/Description: Students are required to complete a substantial software development project consisting of multiple deliverables, with emphasis on architecture and design. The ability to see architectural alternatives and make architectural decisions in the Meta Architecture Document.

Grading Scale:
A : High Quality Work
B+: Above Average Quality Work
B : Average Graduate Accomplishments
C+: Below Average Graduate Work
C : Unsatisfactory
F : Minimum Requirements Not Met

Acceptable Target (shortterm goal): 100% of teams will score B or higher on MetaArchitecture Document
Ideal Target (longterm goal): 100% of teams will score A or higher on MetaArchitecture
2. Students will demonstrate an ability to work as a team to engineer working software.

Measure: Team Project
Details/Description: Students will be required to produce a substantial semester project as a member of a team.
Acceptable Target (shortterm goal): average teamwork evaluation score for class will be 3 out of 4 or better
Ideal Target (longterm goal): Teamwork evaluation score class average will be 3.7+

Assessment Results
Computer Science Specialization (Assessed in CSIS 618)
LO2 = Programming Models
LO4 = Chomsky Hierarchy
S1G = Student 1 Grade, S2G = Student 2 Grade, etc...

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Students Evaluated: 10
Results: Acceptable Target Achievement (short term goal): Met; Ideal Target Achievement (long term goal): Met

Information Systems Specialization (Assessed in CSIS 632)
Findings for Client/Server Programming Project:
Three programming projects were assigned. 100% of the class scored B or higher in Project 1, 100% of the class scored B or higher in Project 2. 90% of the class scored B or higher in Project 3. Goal was met. One bonus programming project was assigned towards the end of the semester.
Students Evaluated: 8
Results: Acceptable Target Achievement (short term goal): Met; Ideal Target Achievement (long term goal): Met

Software Engineering Specialization (Assessed in CSIS 656)
1. Findings for Software Development Team Project:
100% of 2 teams scored 3 out of 4 or higher on Meta Architecture
rubric. Goal was met.  
**Students Evaluated:** 8  
**Results:** Acceptable Target Achievement (shortterm goal): Met;  
Ideal Target Achievement (longterm goal): Exceeded. New goal:  
Teams score an average of 3.8 or higher on Meta Architecture Document.

2. Findings for Semester Team Project:  
100% of 2 teams received B or higher on project item. Goal was met.  
**Results:** Acceptable Target Achievement (shortterm goal): Met; new goal 3.4 or better  
Ideal Target Achievement (longterm goal): Approaching

**Use of Results**  
**Computer Science Specialization (Assessed in CSIS 618)**  
Context sensitive language discussion could come earlier in the course in order to facilitate application of the Chomsky Hierarchy.

**Information Systems Specialization (Assessed in CSIS 632)**  
All the programming projects used TCP sockets. As the Linux Virtual Machine did not support UDP sockets, no programming projects were assigned using UDP sockets. Other possibilities will be investigated in the future for assigning programming projects using UDP sockets.

**Software Engineering Specialization (Assessed in CSIS 656)**  
In 2014, at least one draft of the MetaArchitecture Document one week after it was assigned. Each week the instructor pointed out new ideas to consider for possible inclusion in MetaArchitecture and other documents. After the first draft was reviewed, the students were given a rubric by which the final version would be evaluated. They were encouraged to ask questions, and to submit additional drafts for review. These ideas will continue to be used next time in 2016. Also, we covered the chapter on security for the first time, in place of another chapter, and that will continue next time.

3 items for improvement next time:
1) Students seemed to struggle seeing their documentation as part of a whole. Next time, I will give them a software design document template that incorporates all of the items explicitly, so they can see they are working on specific parts of a coherent whole. For each part, they will receive an explicit, written rubric to be used for evaluation. They struggled to find templates for what I was asking, but did not take advantage of one SDD template that I had given them to optionally use. So a customized version of the optional template will become mandatory. In fact, I will make them customize it as part of class.

2) As part of the code submission, a copy of the submission log from their code repository will be required. It will be easier to see if everyone is working on the code, and which parts of code.

3) A second midterm exam was given at the end of the course, but one chapter was not included, because of the schedule. A written portion of the final exam was planned, but was deemed unnecessary and redundant one week after the second exam. Furthermore, this is
a critical period, when students are working on code and final project deliverables. A written final exam is a distraction from completing these items. Rework the schedule so that all chapters are covered on the two exams.

**Budget Changes**
No budget changes are required.

**Comments and Attachments**

**Computer Science Specialization (Assessed in CSIS 618)**
The students (in general) did a very good job on presenting their survey of 4 languages (LO2). There was some trouble with the Chomsky Hierarchy (LO4)—they understood the idea in relation to generating a parser (and creating the BNF), but only possessed a basic understanding of context-sensitive languages. (They have a good idea of regular vs context-free vs recursively enumerable, which is *probably* the most important part.)

**Information Systems Specialization (Assessed in CSIS 632)**
Students were challenged with a bonus programming project. They were given only one week at the end of the semester to complete the project. Only 27% of the class submitted the bonus programming project. Students will be given more time for the bonus project in the future.

**Software Engineering Specialization (Assessed in CSIS 656)**
Students struggled with MetaArchitecture, in just the ways I wanted them to. I was pleased with the results. They also struggled a little too much with other items when I did not give them templates to work from. However, they also struggled to see their deliverables as part of a coherent whole, and especially struggled with creating an ICD and seeing it as part of Logical Architecture. I did not expect that much struggling with the ICD.

**Related Items**

2: Develop nationally recognized graduate programs.

8: Collaborate with local, national and international institutions to leverage higher education for a stronger South Carolina.
Summary of assessment results with focus on program improvement (to be shared publicly)

In FY13 a survey was administered to graduates to assess the three specialization areas. This crude instrument for assessing the MSCS program was replaced by a finer grained instrument which breaks out each individual specialization (computer science, information systems, and software engineering). The result is a more objective metric for assessing the specializations.

For both the "core courses" and "specialization areas", clearly stated "use of results" sections have been populated. Within these sections proposed "tweaks" are listed for improving the respective areas and courses. Professors teaching these courses FY15 and beyond, will be made privy to these "use of results" items and expected to either act on the suggestions, or consider alternative solutions to the issues the items were intended to address. A summary of the corrective actions taken will be articulated in successive Program Improvement Summaries.

Related Items

There are no related items.
Computer Information Systems - BS/Minor

Program Name: Computer Information Systems
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Department Chair (Starr, Christopher)
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
Date of next program review:

Program/Department Mission Statement
The primary mission of the Computer Science Department is teaching undergraduate and graduate students of the College of Charleston. The Department provides students with the necessary conceptual tools for life-long learning through exposure to well-designed curricula, research and co-curricular experiences. These curricula merge strong theoretical foundations with current methodologies and tools.

The Department actively supports faculty development in teaching and scholarship. This allows Computer Science faculty to stay current in and contribute to the discipline, and to incorporate state-of-the-art advances into the classroom and curricula.

The secondary mission of the Computer Science Department is service to campus, community, international activities, and faculty.

Unit or School Mission
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:
APPENDIX D: ASSESSMENT REPORT

- 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 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.

Computer Information Systems, Undergraduate

**Comments and Attachments**
This program (BS Computer Information Systems) does not hold a program accreditation from ABET, but the three courses evaluated above are part of the BS Computer Science program and enjoy the same rigorous assessment.
APPENDIX D: ASSESSMENT REPORT

- Associate Dean Comments and Completed Rubric
- CSCI CURRICULUM MAP

Program follows specialized accreditation standards: [ ]
Name of accrediting organization:
Date of last program review for the accrediting organization:
Related Items
There are no related items.

1: Define Computing Requirements

Program Goal or SLO
An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution

Assessment Method / Performance Expected

Assessment Question
Given the following problem, identify the best set of computing requirements for the problem.
A client runs a local pet store. The client would like to keep track of the customers who have shared their email address and send an email to them on a monthly basis.
The computing requirements appropriate to a solution is best described as:
A) a database on a server
B) a mobile app interface or web app interface
C) a microcontroller for actuating a lever
D) A and B
E) A, B and C

Rubric
First year (CSCI 220): 50% will select the correct answer of D.
Middle years (CSCI 230): 70% will select the correct answer of D.
Senior year (CSCI 462): 90% will select the correct answer of D.

Assessment Results

Use of Results

Budget Changes

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

2: Design, Implement, and Evaluate

Program Goal or SLO
An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs

Assessment Method / Performance Expected
Assessment Question
Evaluate the code meant to sum the integers from 1 to 10. Which solution below, that uses a loop, produces the correct result? Assume sum is initialized to 0.
A) for (int i=1; i<=10; i++) sum=sum-i;
B) for (int i=0; i<10; i++) sum=sum+(i+1);
C) for (int i=1; i>0; i--) sum=sum+i;
D) for (int i=10; i>1; i--) sum=sum+i;
E) sum=10*11/2;

Rubric
First year (CSCI 220): 50% will select the correct answer of B.
Middle years (CSCI 230): 70% will select the correct answer of B.
Senior year (CSCI 462): 90% will select the correct answer of B.

Assessment Results
Use of Results
Budget Changes
Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

3: Techniques, Skills, and Tools
Program Goal or SLO
An ability to use current techniques, skills, and tools necessary for computing practices

Assessment Method / Performance Expected
Assessment Question
Check the software development tools that you have successfully used in developing software solutions so far in your undergraduate degree coursework.
A) BlueJay
B) Eclipse
C) Netbeans
D) Idle
E) Notepad/textpad
F) TextWrangler

Rubric
First year (CSCI 220): 90% will have used at least one in the list above
Middle years (CSCI 230): 90% will have used at least two in the list above
Senior year (CSCI 462): 90% will have used at least three in the list above

Assessment Results

Use of Results

Budget Changes

Comments and Attachments

Related Items

1: Enhance the undergraduate academic core.

Program Improvement Summary FY 2014
Summary of assessment results with focus on program improvement (to be shared publicly)
Assessment and Evaluation
May 2014
Program: BS Computer Information Systems
by Chris Starr
Program Goal 1. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

Assessment Question
Given the following problem, identify the best set of computing requirements for the problem.

A client runs a local pet store. The client would like to keep track of the customers who have shared their email address and send an email to them on a monthly basis.

The computing requirements appropriate to a solution is best described as:
A) a database on a server
B) a mobile app interface or web app interface
C) a microcontroller for actuating a lever
D) A and B
E) A, B and C

Rubric
First year (CSCI 220): 50% will select the correct answer of D.
Middle years (CSCI 230): 70% will select the correct answer of D.
Senior year (CSCI 462): 90% will select the correct answer of D.

Results
First year:
Problem 1: 50% got the problem correct. The goal was 50%. The students responding met this goal, but just did so.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:
Problem 1: 47% got the problem correct. The goal was 90%. The students responding did not meet the goal.

Evaluation
A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

Program Goal 2. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs

Assessment Question
Evaluate the code meant to sum the integers from 1 to 10. Which
solution below, that uses a loop, produces the correct result? Assume sum is initialized to 0.

A) for (int i=1; i<=10; i++) sum=sum-i;
B) for (int i=0; i<10; i++) sum=sum+(i+1);
C) for (int i=1; i>0; i--) sum=sum+i;
D) for (int i=10; i>1; i--) sum=sum+i;
E) sum=10*11/2;

**Rubric**
First year (CSCI 220): 50% will select the correct answer of B.
Middle years (CSCI 230): 70% will select the correct answer of B.
Senior year (CSCI 462): 90% will select the correct answer of B.

**Results**
First year:
Problem 2: 65% got the problem correct. The goal was 50%. The students responding met this goal, but just did so.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:
Problem 2: 67% got the problem correct. The goal was 90%. The students responding did not meet the goal.

**Evaluation**
The first year students met this goal, but the senior students responding did not meet the goal. A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

**Program Goal 3. An ability to use current techniques, skills, and tools necessary for computing practices.**

**Assessment Question**
Check the software development tools that you have successfully used in developing software solutions so far in your undergraduate degree coursework.

A) BlueJay
B) Eclipse
C) Netbeans
D) Idle
E) Notepad/textpad
F) TextWrangler

**Rubric**
First year (CSCI 220): 90% will have used at least one in the list
above
Middle years (CSCI 230): 90% will have used at least two in the list above
Senior year (CSCI 462): 90% will have used at least three in the list above

**Results**
First year:
Problem 3: 100% of 26 students reported use of one or more development environments. The goal was 90%. The students responding met this goal.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:
Problem 3: 86% of the students reported use of three or more development environments. The goal was 90%.

**Evaluation**
The first year students met this goal, but the senior students responding did not meet the goal. A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

**Related Items**
*There are no related items.*
Computer Science - BA

Program Name: Computer Science
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator:
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
Date of next program review: 2012-2013

Program/Department Mission Statement
The primary mission of the Computer Science Department is teaching undergraduate and graduate students of the College of Charleston. The Department provides students with the necessary conceptual tools for life-long learning through exposure to well-designed curricula, research and co-curricular experiences. These curricula merge strong theoretical foundations with current methodologies and tools.

The Department actively supports faculty development in teaching and scholarship. This allows Computer Science faculty to stay current in and contribute to the discipline, and to incorporate state-of-the-art advances into the classroom and curricula.

The secondary mission of the Computer Science Department is service to campus, community, international activities, and faculty.

Unit or School Mission
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:
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 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.

**Comments and Attachments**

These results are part of a larger assessment of the BS Computer Science Program for the Accreditation Board for Engineering and Technology.

- **Associate Dean Comments and Completed Rubric**
CSCI CURRICULUM MAP

Program follows specialized accreditation standards: ✔
Name of accrediting organization: Accreditation Board for Engineering and Technology
Date of last program review for the accrediting organization: 2006-2007

Related Items
There are no related items.

1: Define Computing Requirements

Program Goal or SLO
An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution

Assessment Method / Performance Expected
Assessment Question
Given the following problem, identify the best set of computing requirements for the problem.
A client runs a local pet store. The client would like to keep track of the customers who have shared their email address and send an email to them on a monthly basis.
The computing requirements appropriate to a solution is best described as:
A) a database on a server
B) a mobile app interface or web app interface
C) a microcontroller for actuating a lever
D) A and B
E) A, B and C

Rubric
First year (CSCI 220): 50% will select the correct answer of D.
Middle years (CSCI 230): 70% will select the correct answer of D.
Senior year (CSCI 462): 90% will select the correct answer of D.

Assessment Results

Use of Results

Budget Changes

Comments and Attachments

Related Items
1: Enhance the undergraduate academic core.

2: Design, Implement, and Evaluate

Program Goal or SLO
An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs

Assessment Method / Performance Expected
Program Goal 2. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs

Assessment Question
Evaluate the code meant to sum the integers from 1 to 10. Which solution below, that uses a loop, produces the correct result? Assume sum is initialized to 0.
A) for (int i=1; i<=10; i++) sum=sum-i;
B) for (int i=0; i<10; i++) sum=sum+(i+1);
C) for (int i=1; i>0; i--) sum=sum+i;
D) for (int i=10; i>1; i--) sum=sum+i;
E) sum=10*11/2;

Rubric
First year (CSCI 220): 50% will select the correct answer of B.
Middle years (CSCI 230): 70% will select the correct answer of B.
Senior year (CSCI 462): 90% will select the correct answer of B.

Assessment Results

Use of Results

Budget Changes

Comments and Attachments

Related Items

1: Enhance the undergraduate academic core.
3: Techniques, Skills, and Tools

Program Goal or SLO
An ability to use current techniques, skills, and tools necessary for computing practices

Assessment Method / Performance Expected

Assessment Question
Check the software development tools that you have successfully used in developing software solutions so far in your undergraduate degree coursework.
A) BlueJay
B) Eclipse
C) Netbeans
D) Idle
E) Notepad/textpad
F) TextWrangler

Rubric
First year (CSCI 220): 90% will have used at least one in the list above
Middle years (CSCI 230): 90% will have used at least two in the list above
Senior year (CSCI 462): 90% will have used at least three in the list above

Assessment Results

Use of Results

Budget Changes

Comments and Attachments

Related Items

1: Enhance the undergraduate academic core.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
Assessment and Evaluation
May 2014
Program: BA Computer Science
Program Goal 1. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

Assessment Question
Given the following problem, identify the best set of computing requirements for the problem.

A client runs a local pet store. The client would like to keep track of the customers who have shared their email address and send an email to them on a monthly basis.

The computing requirements appropriate to a solution is best described as:
A) a database on a server
B) a mobile app interface or web app interface
C) a microcontroller for actuating a lever
D) A and B
E) A, B and C

Rubric
First year (CSCI 220): 50% will select the correct answer of D.
Middle years (CSCI 230): 70% will select the correct answer of D.
Senior year (CSCI 462): 90% will select the correct answer of D.

Results
First year:
Problem 1: 50% got the problem correct. The goal was 50%. The students responding met this goal, but just did so.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:
Problem 1: 47% got the problem correct. The goal was 90%. The students responding did not meet the goal.

Evaluation
A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

Program Goal 2. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs

Assessment Question
Evaluate the code meant to sum the integers from 1 to 10. Which solution below, that uses a loop, produces the correct result? Assume sum is initialized to 0.

A) for (int i=1; i<=10; i++) sum=sum-i;
B) for (int i=0; i<10; i++) sum=sum+(i+1);
C) for (int i=1; i>0; i--) sum=sum+i;
D) for (int i=10; i>1; i--) sum=sum+i;
E) sum=10*11/2;

**Rubric**
First year (CSCI 220): 50% will select the correct answer of B.
Middle years (CSCI 230): 70% will select the correct answer of B.
Senior year (CSCI 462): 90% will select the correct answer of B.

**Results**
First year:
Problem 2: 65% got the problem correct. The goal was 50%. The students responding met this goal, but just did so.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:
Problem 2: 67% got the problem correct. The goal was 90%. The students responding did not meet the goal.

**Evaluation**
The first year students met this goal, but the senior students responding did not meet the goal. A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

**Program Goal 3. An ability to use current techniques, skills, and tools necessary for computing practices.**

**Assessment Question**
Check the software development tools that you have successfully used in developing software solutions so far in your undergraduate degree coursework.

A) BlueJay
B) Eclipse
C) Netbeans
D) Idle
E) Notepad/textpad
F) TextWrangler

**Rubric**
First year (CSCI 220): 90% will have used at least one in the list above
Middle years (CSCI 230): 90% will have used at least two in the list above
Senior year (CSCI 462): 90% will have used at least three in the list above

**Results**
First year:
Problem 3: 100% of 26 students reported use of one or more development environments. The goal was 90%. The students responding met this goal.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:
Problem 3: 86% of the students reported use of three or more development environments. The goal was 90%.

**Evaluation**
The first year students met this goal, but the senior students responding did not meet the goal. A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

**Related Items**
*There are no related items.*
Computer Science - BS

Program Name: Computer Science
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Department Chair (Starr, Christopher)
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
Date of next program review: 2012-2013

Program/Department Mission Statement
The primary mission of the Computer Science Department is teaching undergraduate and graduate students of the College of Charleston. The Department provides students with the necessary conceptual tools for life-long learning through exposure to well-designed curricula, research and co-curricular experiences. These curricula merge strong theoretical foundations with current methodologies and tools.

The Department actively supports faculty development in teaching and scholarship. This allows Computer Science faculty to stay current in and contribute to the discipline, and to incorporate state-of-the-art advances into the classroom and curricula.

The secondary mission of the Computer Science Department is service to campus, community, international activities, and faculty.

Unit or School Mission
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;
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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;
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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 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.

**Comments and Attachments**

These results are part of a larger assessment of the BS Computer Science Program for the Accreditation Board for Engineering and Technology.

Describe in short narrative previous years’ assessments (2006-2011) and how these assessments relate to the current process.

The Computer Science degree program at the BS level has been accredited by ABET since the 1990s. The BA program is a proper subset of the BS program and enjoys the benefits of this
The department’s assessment program is maturing. In 2006 we codified the program and have worked to improve it each year. In 2011 the department added course objectives and aligned them to program objectives.

In 2001-2002, the SC Commission on Higher Education did a review of this program following a self-study by the department. The program in part led to the department receiving a Commendation of Excellence.

- Associate Dean Comments and Completed Rubric
- CSCI BS Report and Supporting Docs 2011 2012
- CSCI CURRICULUM MAP

**Program follows specialized accreditation standards:**

**Name of accrediting organization:** Accreditation Board for Engineering and Technology

**Date of last program review for the accrediting organization:** 2006-2007

**Related Items**

*There are no related items.*

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**1: Define Computing Requirements**

**Program Goal or SLO**

An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution

**Assessment Method / Performance Expected**

**Assessment Question**

Given the following problem, identify the best set of computing requirements for the problem. A client runs a local pet store. The client would like to keep track of the customers who have shared their email address and send an email to them on a monthly basis.

The computing requirements appropriate to a solution is best described as:

A) a database on a server
B) a mobile app interface or web app interface
C) a microcontroller for actuating a lever
D) A and B
E) A, B and C
Rubric
First year (CSCI 220): 50% will select the correct answer of D. Middle years (CSCI 230): 70% will select the correct answer of D. Senior year (CSCI 462): 90% will select the correct answer of D.

Assessment Results

Use of Results

Budget Changes

Comments and Attachments

Related Items

1: Enhance the undergraduate academic core.

2: Design, Implement, and Evaluate

Program Goal or SLO
An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs

Assessment Method / Performance Expected

Assessment Question
Evaluate the code meant to sum the integers from 1 to 10. Which solution below, that uses a loop, produces the correct result? Assume sum is initialized to 0.
A) for (int i=1; i<=10; i++) sum=sum-i;
B) for (int i=0; i<10; i++) sum=sum+(i+1);
C) for (int i=1; i>0; i--) sum=sum+i;
D) for (int i=10; i>1; i--) sum=sum+i;
E) sum=10*11/2;

Rubric
First year (CSCI 220): 50% will select the correct answer of B. Middle years (CSCI 230): 70% will select the correct answer of B. Senior year (CSCI 462): 90% will select the correct answer of B.

Assessment Results

Use of Results
1: Enhance the undergraduate academic core.

3: Techniques, Skills, and Tools

Program Goal or SLO
An ability to use current techniques, skills, and tools necessary for computing practices

Assessment Method / Performance Expected

Assessment Question
Check the software development tools that you have successfully used in developing software solutions so far in your undergraduate degree coursework.
A) BlueJay
B) Eclipse
C) Netbeans
D) Idle
E) Notepad/textpad
F) TextWrangler

Rubric
First year (CSCI 220): 90% will have used at least one in the list above
Middle years (CSCI 230): 90% will have used at least two in the list above
Senior year (CSCI 462): 90% will have used at least three in the list above

Assessment Results

Use of Results
Budget Changes
Comments and Attachments
Related Items
1: Enhance the undergraduate academic core.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
Assessment and Evaluation
May 2014
Program: BS Computer Science
by Chris Starr

Program Goal 1. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

Assessment Question
Given the following problem, identify the best set of computing requirements for the problem.

A client runs a local pet store. The client would like to keep track of the customers who have shared their email address and send an email to them on a monthly basis.

The computing requirements appropriate to a solution is best described as:
A) a database on a server
B) a mobile app interface or web app interface
C) a microcontroller for actuating a lever
D) A and B
E) A, B and C

Rubric
First year (CSCI 220): 50% will select the correct answer of D.
Middle years (CSCI 230): 70% will select the correct answer of D.
Senior year (CSCI 462): 90% will select the correct answer of D.

Results
First year:
Problem 1: 50% got the problem correct. The goal was 50%. The students responding met this goal, but just did so.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for
Senior year:
Problem 1: 47% got the problem correct. The goal was 90%. The students responding did not meet the goal.

**Evaluation**
A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

**Program Goal 2. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs**

**Assessment Question**
Evaluate the code meant to sum the integers from 1 to 10. Which solution below, that uses a loop, produces the correct result? Assume sum is initialized to 0.

A) for (int i=1; i<=10; i++) sum=sum-i;
B) for (int i=0; i<10; i++) sum=sum+(i+1);
C) for (int i=1; i>0; i--) sum=sum+i;
D) for (int i=10; i>1; i--) sum=sum+i;
E) sum=10*11/2;

**Rubric**
First year (CSCI 220): 50% will select the correct answer of B.  
Middle years (CSCI 230): 70% will select the correct answer of B.  
Senior year (CSCI 462): 90% will select the correct answer of B.

**Results**
First year:
Problem 2: 65% got the problem correct. The goal was 50%. The students responding met this goal, but just did so.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:
Problem 2: 67% got the problem correct. The goal was 90%. The students responding did not meet the goal.

**Evaluation**
The first year students met this goal, but the senior students responding did not meet the goal. A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

**Program Goal 3. An ability to use current techniques, skills, and tools necessary for computing practices.**
**Assessment Question**
Check the software development tools that you have successfully used in developing software solutions so far in your undergraduate degree coursework.

A) BlueJay  
B) Eclipse  
C) Netbeans  
D) Idle  
E) Notepad/textpad  
F) TextWrangler

**Rubric**
First year (CSCI 220): 90% will have used at least one in the list above  
Middle years (CSCI 230): 90% will have used at least two in the list above  
Senior year (CSCI 462): 90% will have used at least three in the list above

**Results**
First year:  
Problem 3: 100% of 26 students reported use of one or more development environments. The goal was 90%. The students responding met this goal.

Middle years:  
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:  
Problem 3: 86% of the students reported use of three or more development environments. The goal was 90%.

**Evaluation**
The first year students met this goal, but the senior students responding did not meet the goal. A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

**Related Items**
*There are no related items.*
Computer Science - Minor

Computer Science Minor
Program Name: Computer Science Minor
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator:
Administrative Unit Director receiving assessment updates:
Date of next program review:

Program/Department Mission Statement

Unit or School Mission

Comments and Attachments
Program follows specialized accreditation standards: ☐
Name of accrediting organization:
Date of last program review for the accrediting organization:

Related Items
There are no related items.

1: Define Computing Requirements

Program Goal or SLO
An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

Assessment Method / Performance Expected
Assessment Question
Given the following problem, identify the best set of computing requirements for the problem.
A client runs a local pet store. The client would like to keep track of the customers who have shared their email address and send an email to them on a monthly basis.
The computing requirements appropriate to a solution is best described as:
A) a database on a server
B) a mobile app interface or web app interface
C) a microcontroller for actuating a lever
D) A and B
E) A, B and C
Rubric
First year (CSCI 220): 50% will select the correct answer of D. Middle years (CSCI 230): 70% will select the correct answer of D. Senior year (CSCI 462): 90% will select the correct answer of D.

Assessment Results

Use of Results

Budget Changes

Comments and Attachments

Related Items

1: Enhance the undergraduate academic core.

2: Design, Implement and Evaluate

Program Goal or SLO
An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs

Assessment Method / Performance Expected

Assessment Question
Evaluate the code meant to sum the integers from 1 to 10. Which solution below, that uses a loop, produces the correct result? Assume sum is initialized to 0.
A) for (int i=1; i<10; i++) sum=sum-i;
B) for (int i=0; i<10; i++) sum=sum+(i+1);
C) for (int i=1; i>0; i--) sum=sum+i;
D) for (int i=10; i>1; i--) sum=sum+i;
E) sum=10*11/2;

Rubric
First year (CSCI 220): 50% will select the correct answer of B. Middle years (CSCI 230): 70% will select the correct answer of B. Senior year (CSCI 462): 90% will select the correct answer of B.

Assessment Results

Use of Results
Budget Changes

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

3: Techniques, Skills and Tools

Program Goal or SLO
An ability to use current techniques, skills, and tools necessary for computing practices.

Assessment Method / Performance Expected
Assessment Question
Check the software development tools that you have successfully used in developing software solutions so far in your undergraduate degree coursework.
A) BlueJay
B) Eclipse
C) Netbeans
D) Idle
E) Notepad/textpad
F) TextWrangler

Rubric
First year (CSCI 220): 90% will have used at least one in the list above
Middle years (CSCI 230): 90% will have used at least two in the list above
Senior year (CSCI 462): 90% will have used at least three in the list above

Assessment Results
Use of Results
Budget Changes
Comments and Attachments
Related Items
1: Enhance the undergraduate academic core.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
Assessment and Evaluation
May 2014
Program: Minor Computer Science
by Chris Starr

Program Goal 1. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.

Assessment Question
Given the following problem, identify the best set of computing requirements for the problem.

A client runs a local pet store. The client would like to keep track of the customers who have shared their email address and send an email to them on a monthly basis.

The computing requirements appropriate to a solution is best described as:
A) a database on a server
B) a mobile app interface or web app interface
C) a microcontroller for actuating a lever
D) A and B
E) A, B and C

Rubric
First year (CSCI 220): 50% will select the correct answer of D.
Middle years (CSCI 230): 70% will select the correct answer of D.
Senior year (CSCI 462): 90% will select the correct answer of D.

Results
First year:
Problem 1: 50% got the problem correct. The goal was 50%. The students responding met this goal, but just did so.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for
this year for the Middle year students.

Senior year:
Problem 1: 47% got the problem correct. The goal was 90%. The students responding did not meet the goal.

**Evaluation**
A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

**Program Goal 2. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs**

**Assessment Question**
Evaluate the code meant to sum the integers from 1 to 10. Which solution below, that uses a loop, produces the correct result? Assume sum is initialized to 0.

A) for (int i=1; i<=10; i++) sum=sum-i;
B) for (int i=0; i<10; i++) sum=sum+(i+1);
C) for (int i=1; i>0; i--) sum=sum+i;
D) for (int i=10; i>1; i--) sum=sum+i;
E) sum=10*11/2;

**Rubric**
First year (CSCI 220): 50% will select the correct answer of B.
Middle years (CSCI 230): 70% will select the correct answer of B.
Senior year (CSCI 462): 90% will select the correct answer of B.

**Results**
First year:
Problem 2: 65% got the problem correct. The goal was 50%. The students responding met this goal, but just did so.

Middle years:
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:
Problem 2: 67% got the problem correct. The goal was 90%. The students responding did not meet the goal.

**Evaluation**
The first year students met this goal, but the senior students responding did not meet the goal. A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

**Program Goal 3. An ability to use current techniques, skills, and tools necessary for computing practices.**
Assessment Question
Check the software development tools that you have successfully used in developing software solutions so far in your undergraduate degree coursework.

A) BlueJay  
B) Eclipse  
C) Netbeans  
D) Idle  
E) Notepad/textpad  
F) TextWrangler

Rubric
First year (CSCI 220): 90% will have used at least one in the list above  
Middle years (CSCI 230): 90% will have used at least two in the list above  
Senior year (CSCI 462): 90% will have used at least three in the list above

Results
First year:  
Problem 3: 100% of 26 students reported use of one or more development environments. The goal was 90%. The students responding met this goal.

Middle years:  
The instructor for CSCI 230 (Middle years) forgot to give the questions to the students, even after a reminder. There is no data for this year for the Middle year students.

Senior year:  
Problem 3: 86% of the students reported use of three or more development environments. The goal was 90%.

Evaluation
The first year students met this goal, but the senior students responding did not meet the goal. A problem has been identified. A change request will be made to the faculty to investigate potential improvements to the curriculum at the senior year level.

Related Items
There are no related items.
Computing in the Arts - BA

Program Name: Computing in the Arts
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Professor (Manaris, Bill)
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
Date of next program review:

Program/Department Mission Statement
The primary mission of the Computer Science Department is teaching undergraduate and graduate students of the College of Charleston. The Department provides students with the necessary conceptual tools for life-long learning through exposure to well-designed curricula, research and co-curricular experiences. These curricula merge strong theoretical foundations with current methodologies and tools.

The Department actively supports faculty development in teaching and scholarship. This allows Computer Science faculty to stay current in and contribute to the discipline, and to incorporate state-of-the-art advances into the classroom and curricula.

The secondary mission of the Computer Science Department is service to campus, community, international activities, and faculty.

Unit or School Mission
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:
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 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.

Computing in the Arts, Undergraduate

Comments and Attachments

- Associate Dean Comments and Completed Rubric

Program follows specialized accreditation standards: [ ]
Name of accrediting organization:
1: Computing Requirement

Program Goal or SLO
Students acquire the knowledge and skills to combine creativity in the arts with the tools and conceptual modeling systems of computing. For the computing requirement, students acquire competency in programming and problem solving, and object-oriented programming. They also demonstrate competency in applying these concepts to more advanced areas of computer science.

Assessment Method / Performance Expected
CITA students are required to take computing courses CSCI 220 and CSCI 221. Some elect to also take CSCI 230. The performance expected is complete the required courses with grades of C minus or better. The method is to count the percentage of CITA students that score a C minus or better.

Assessment Results
CSCI 220 Computer Programming I: 86% (39 of 45) passed with a C- or better. 14% failed.
CSCI 221 Computer Programming II: 67% (30 of 46) passed with a C- or better. 33% failed.
CSCI 230 Data Structures and Algorithm Analysis: 100% (3 students) passed with satisfactory or higher performance of C- or better. 0% failed in fall 2013.

Use of Results
We are investigating using more fine-grained analysis in the future such as an examination metrics that assess specific computational programming skills such as understanding the specific program design and analysis concepts.

Budget Changes
No changes are anticipated.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.
2: Arts Concentration Requirement

Program Goal or SLO
Students acquire the knowledge and skills to combine creativity in the arts with the tools and conceptual modeling systems of computing. For the arts concentration requirement, students acquire competency in creativity and critical thinking skills. Additionally, based on their concentration (Art, Music, or Theatre) they acquire competency in intuitive and analytical decision making, history, performance, and/or theory.

Assessment Method / Performance Expected
Count the number of students who passed required CITA arts concentration courses with a grade of C minus or better. CITA majors can choose one of several arts areas including visual arts, music, or theatre.

Assessment Results
Visual arts concentration requires ARTS 119 Drawing I and ARTH 287 New Media in Contemporary Arts.
ARTS 119: 97% (34 of 35) passed with a C minus or better. 2% failed.
ARTH 287: 100% (16 of 16) passed with a C minus or better. 0% failed.

Music concentration requires MUSC 146 Fundamentals of Music and MUSC 246 Music Theory I.
MUSC 146: 85% (18 of 21) passed with a C minus or better. 15% failed.
MUSC 246: 89% (8 of 9) passed with a C minus or better. 11% failed.

Theatre concentration requires THTR 276 Script Analysis, THTR 277 Acting I: Basic Approach, and THTR 355 Playwriting I.
THTR 276: 75% (3 of 4) passed with a C minus or better. 25% failed.
THTR 277: 100% (5 of 5) passed with a C minus or better. 0% failed.
THTR 355: 100% (3 of 3) passed with a C minus or better. 0% failed.

Use of Results
We are discussing more fine-grained assessment methods for future
Budget Changes
None anticipated.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

3: Synthesis Requirement

Program Goal or SLO
Students acquire the knowledge and skills to combine creativity in the arts with the tools and conceptual modeling systems of computing. For the synthesis requirement, students demonstrate competency in (a) incorporating computational tools and techniques into the creative process to achieve an artistic vision, or (b) incorporating creativity, aesthetics and design into new computational techniques, innovative products, or improved problem solving and original inquiry.

Assessment Method / Performance Expected
CITA students demonstrate synthesis in CITA courses 120 and CITA 180 and formulating and executing capstone projects that combine elements of computing and arts. CITA 295 is the junior-year seminar in which they formulate projects and CITA 495 is the capstone project. Expected performance is passing the course with a grade of C minus or better.

Assessment Results
CITA 120 Building Virtual Worlds: 93% (15 of 16) passed with a C minus or higher. 7% failed.
CITA 180 Computers, Music, and Art: 95% (22 of 23) passed with a C minus or higher. 5% failed.
Results from spring 2014 CITA 295 show 13 of 14 students passing with a grade of C minus or better. Results from spring 2014 CITA 495 show 9 of 9 students passing with a grade of C minus or better.

Use of Results
Grade outcomes and the polished and creative presentations suggest that the CITA program is successful in producing capstone projects that incorporate computational problem-solving with artistic vision and creativity. We will design and implement more detailed methods
for assessment of learning outcomes as the CITA program matures.

**Budget Changes**
No changes are planned.

**Comments and Attachments**

**Related Items**

1: Enhance the undergraduate academic core.

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**Program Improvement Summary FY 2014**

**Summary of assessment results with focus on program improvement (to be shared publicly)**
Overall objective results based on course grades suggest that CITA students show strong performance in arts concentrations. We are discussing ways to improve performance of CITA students in computing by aligning programming-related learning outcomes in CITA 120, CITA 180, and CITA 210 with those outcomes expected in the computer science core classes of CSCI 220, 221, and 230. Our expectation is that the introductory CITA courses would then provide a first-pass introduction to most of the same learning goals that they will see for a second time in the computer science core classes. We are also discussing the choice of programming language(s) used in CITA introductory courses 120, 180, and 210 so that we have a smooth transition into the computer science core courses. Informally, CITA students presented an impressive array of diverse and creative capstone projects at the end of the spring 2014 semester.

**Related Items**
*There are no related items.*
Data Science - BS/Minor

Data Science - BS
Program Name: Data Science
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Assistant Professor (Anderson, Paul), Department Chair (Mignone, Robert)
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
Date of next program review:

Program/Department Mission Statement
The primary mission of the Computer Science Department is teaching undergraduate and graduate students of the College of Charleston. The Department provides students with the necessary conceptual tools for life-long learning through exposure to well-designed curricula, research and co-curricular experiences. These curricula merge strong theoretical foundations with current methodologies and tools.

The Department actively supports faculty development in teaching and scholarship. This allows Computer Science faculty to stay current in and contribute to the discipline, and to incorporate state-of-the-art advances into the classroom and curricula.

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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:
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 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.

Discovery Informatics, Undergraduate

**Comments and Attachments**
This program (BS Computer Information Systems) does not hold a program accreditation from ABET, but the three courses evaluated above are part of the BS Computer Science program and enjoy the same rigorous assessment. Describe in short narrative previous years’ assessments (2006-2011) and how these assessments relate to the current process.
In 2010, the Discovery Informatics curriculum was assessed to determine what courses could be eliminated and still achieve the stated learning outcomes for the program. No courses were identified for elimination.
In 2011, the program was evaluated for the purposes of a new marketing plan. The evaluation resulted in a plan to rename the program Data Science.

- Associate Dean Comments and Completed Rubric
- Supporting Document 1 2011 2012

Program follows specialized accreditation standards: ☐
Name of accrediting organization: 
Date of last program review for the accrediting organization: 
Related Items
There are no related items.

1: Core Computer Science Competency

Program Goal or SLO
Students gain competency in computer science, including programming, data organization, data mining, data structures, and algorithms.

Assessment Method / Performance Expected
Competency will be measured via a comprehensive examination administered when the student is registered in the capstone course (DATA 495). The questions included will be pulled from representative courses. For this core competency that includes CSCI 221, CSCI 334, and DATA 210.

Assessment Results
The 8 graduating seniors completed an examination that pulled from the core courses mentioned in the description. These students answered at least 80% of the questions correctly.

Use of Results
These results indicate that we are reaching our goals; however, I (Paul Anderson) ran the capstone courses, and I believe that this assessment test needs to be expanded and the depth of it increased. This is the first time we've administered such an exam, and therefore, it is not unexpected or alarming that we would want to update the
exam.

**Budget Changes**
We are lacking a data scientist who focuses on database systems. This is necessary to support the current database course and the database course that is currently being proposed. This new database course is necessary to keep the program up-to-date.

**Comments and Attachments**

**Related Items**

1: Enhance the undergraduate academic core.

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## 2: Core Mathematics and Statistics Competency

**Program Goal or SLO**
Students gain competency in core area of mathematics and statistics, including pre-calculus, calculus, and statistical inference.

**Assessment Method / Performance Expected**
Competency will be measured via a comprehensive examination administered when the student is registered in the capstone course (DATA 495). The questions included will be pulled from representative courses. For this core competency that includes MATH 250, MATH 440, and MATH 441.

**Assessment Results**
The 8 graduating seniors completed an examination that pulled from the core courses mentioned in the description. These students answered at least 80% of the questions correctly.

**Use of Results**
These results indicate that we are reaching our goals; however, I (Paul Anderson) created the questions, and I believe that we need to communicate with our colleagues in the math department to improve the questions. This will be done for the second iteration.

**Budget Changes**
No changes.

**Comments and Attachments**

**Related Items**

1: Enhance the undergraduate academic core.
3: Capstone Synthesis Competency

Program Goal or SLO
The competency students acquired in math, stats, and computer science applied through a senior level capstone experience.

Assessment Method / Performance Expected
Competency will be measured via a formal write-up of their capstone project.

Assessment Results
The 8 graduating seniors completed a capstone course. Each student wrote a final project paper and orally presented a poster. Each student received at least 80% of the possible points for these assignments.

Use of Results
The results indicate that the students were successful in synthesizing their knowledge in the form of a final capstone project.

Budget Changes
We ran this course for the first time with a scheduled weekly meeting time. This was very important and greatly improved the capstone experience. In order to offer this, we had to have a single professor (standard 3 load) teach DATA 495 (Capstone), CITA 495 (Capstone), and CITA 295 (seminar) in addition to two additional course CSCI 334 and CSCI 471. We desperately need an additional line to support this growth and someone with the required expertise.

Comments and Attachments

Related Items

1: Enhance the undergraduate academic core.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
8 graduating seniors completed a 10 question examination that pulled
questions from the core courses in data science. All students answered at least 8 out of the 10 questions correctly. In addition, each student received a B or an A on the Data Science Capstone paper. Each student received an B or above for their oral poster presentation and exhibition. In conclusion, these results support the conclusion that the students successfully completed the program outcomes.

Related Items
There are no related items.
Geology and Environmental Geosciences

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)

Related Items
There are no related items.
Geology - BA

Program Name: Geology and Environmental Geosciences
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator:
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
Date of next program review:

Program/Department Mission Statement
The study of geological sciences is an important component of a traditional liberal arts and science education. We view the mission of the Geology Department within the School of Sciences and the College of Charleston, as threefold; (1) to produce quality students educated in geology and environmental geosciences who will pursue active geologically related careers and who will serve the scientific needs of society, (2) to provide the liberal arts student with a meaningful exposure to and knowledge of a scientific discipline. A well-educated and scientifically literate citizenry with an understanding of the fundamental scientific concepts (e.g., earth history, earth processes, earth resources, global change, and environmental hazards) is essential for an individual to function in today’s global society, (3) to provide the local community, state and region with a highly trained and professional staff of geologists to conduct scientific research and investigations, and to serve as a resource for the educational and professional community.

Unit or School Mission
Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.
For a more expansive discussion please see http://ssm.cofc.edu/about-the-school

Comments and Attachments
We have a committee that is designing new pre – and post – course assessment for all the introductory courses (101, 103 and 105) starting in the Fall of 2012. The pre- and post-tests will document students learning and will be used to identify aspects of the courses that can be improved They will provide faculty with information about knowledge, and potential misconceptions, with which students enter the class.
APPENDIX D: ASSESSMENT REPORT

The pre – and post – tests consist of 2 packages with 20 multiple choice questions in each package. One will be the pre – and post – test for the 101 /103 courses and the second one for the 105 classes. The questions will assess students’ higher order thinking skills based on their knowledge and comprehension. The 105 post – test will be 40 questions and will include the 20 101/103 test questions. This will help to assess students’ retention of the materials covered in the 101/103 courses. The questions will be designed specifically to assess students’ ability to apply, analyze and synthesize the acquired knowledge. The content of the questions will be based on the Earth Science Literacy Principles.

- Curriculum Map
- Geology Assessment and Supporting Document 2011 2012

Program follows specialized accreditation standards: □
Name of accrediting organization:
Date of last program review for the accrediting organization:
Related Items
There are no related items.

1: Identify, Describe, and Classify

Program Goal or SLO
identify, describe, and classify minerals, rocks and fossils; make scientific observations of these items in the field and in the laboratory; interpret their observations in a scientifically sound manner;

Assessment Method / Performance Expected
All geology majors who graduate with a BA must take mineralogy, paleontology, petrology, stratigraphy / sedimentology, structural geology and senior seminar. With the exception of senior seminar, all classes have instituted a lab and field components to the class. Each class has a final project that requires identification, description, and classification skills and requires the student to interpret the data and observation. The department will collect a randomized number of projects to assess performance for this goal.

At least 90% of the students will score at least 70% on all five projects

Assessment Results
On going

**Use of Results**
We increased the opportunities for our student to conduct ship board research. Three summer program enable students to conduct marine and aquatic research.

We increased the number of field opportunity for our students, and nearly, every 300 and 400 classes had field projects.

We continued to support field research in western desert, Galapagos, Bahamas, and India.

The department funded student summer research.

**Budget Changes**

The increases in field experiences for our major classes resulted in more funds being reallocated to travel.

**Comments and Attachments**

**Related Items**

1: Enhance the undergraduate academic core.

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**2: Summarize and Explain**

**Program Goal or SLO**
summarize and explain enormity of time, the history of the Earth and its processes, and the evolution of life as recorded in the fossil record.

**Assessment Method / Performance Expected**
All geology majors who graduate with a BA must take mineralogy, paleontology, petrology, stratigraphy / sedimentology, structural geology, and senior seminar. Each class has a final project that requires identification, description, and classification skills and requires knowledge of goal 1 and goal 2. The department will collect a randomized number of projects to assess performance for this goal.

At least 90% of the students will score at least 70% on all five projects

**Assessment Results**
APPENDIX D: ASSESSMENT REPORT

This is ongoing.

**Use of Results**

We will be offering a new type of paleontology course that will become a senior capstone class. This Spring 2015 class will be used to assess this goal.

**Budget Changes**
None

**Comments and Attachments**

**Related Items**

1: Enhance the undergraduate academic core.

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**3: Analyze Dependence**

**Program Goal or SLO**
analyze society’s dependence on Earth resources, the interaction between human activities and the natural environment, and the geological hazards faced by many communities;

**Assessment Method / Performance Expected**
Among the common courses that all geology majors take mineralogy, petrology, and stratigraphy / sedimentology provide the students with opportunities to learn about the items listed in this goal 3. These classes build on knowledge gain in the first semester geology class, which emphasizes hazards and resources. We also encourage students to take elective classes concerning global change, resources, and hazards. In senior seminar, students make presentations concerning current environmental concerns, and each of the elective environmental geology classes has a final project concern either hazards or resources. The department will collect a randomized number of projects and senior presentation to assess performance for this goal.

At least 90% of the students will score at least 70% on all three projects

**Assessment Results**
This is ongoing

**Use of Results**
In the fall 2013, the geology department taught an earth resources class that included mineral and petroleum resources.

The students want more global change information. We taught Geol 288, a global change class, in the spring 2014.

We will be adding more energy and global change topics in our introductory classes.

**Budget Changes**
None

**Comments and Attachments**

**Related Items**

1: Enhance the undergraduate academic core.

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**Program Improvement Summary FY 2014**

**Summary of assessment results with focus on program improvement (to be shared publicly)**
The assessment effort proved to be a catalyst for the department to review its curriculum and teaching methods. We have engaged our students in reviewing our curriculum, and these discussions led us to develop a new course. In the fall, we offered an earth resources class that was equally divided between mineral and petroleum resources. The students want more global change information, and we taught Geol 288, a global change class, in the spring 2014. We will be adding more energy and global change topics to our introductory classes. The faculty has worked to increase the number of field opportunity for our students, and nearly, every 300 and 400 classes had field projects. We increased the opportunities for our student to conduct shipboard research. Three-summer research program enable students to conduct marine and aquatic research. The department has field courses in the western desert, Galapagos, Bahamas, and India. We are changing paleontology course to be a senior capstone class. We are currently, reassessing the department course offerings to determine how well we are addressing the critical issues in geology.

**Related Items**
*There are no related items.*
Geology - BS

Program Name: Geology and Environmental Geosciences
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator:
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
Date of next program review:

Program/Department Mission Statement
The study of geological sciences is an important component of a traditional liberal arts and science education. We view the mission of the Geology Department within the School of Sciences and the College of Charleston, as threefold; (1) to produce quality students educated in geology and environmental geosciences who will pursue active geologically related careers and who will serve the scientific needs of society, (2) to provide the liberal arts student with a meaningful exposure to and knowledge of a scientific discipline. A well-educated and scientifically literate citizenry with an understanding of the fundamental scientific concepts (e.g., earth history, earth processes, earth resources, global change, and environmental hazards) is essential for an individual to function in today's global society, (3) to provide the local community, state and region with a highly trained and professional staff of geologists to conduct scientific research and investigations, and to serve as a resource for the educational and professional community.

Unit or School Mission
Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.
For a more expansive discussion please see http://ssm.cofc.edu/about-the-school

Comments and Attachments
We have a committee that is designing new pre – and post – course assessment for all the introductory courses (101,103 and 105) starting in the Fall of 2012. The pre- and post-tests will document students learning and will be used to identify aspects of the courses that can be improved They will provide faculty with information about knowledge, and potential misconceptions, with which students enter the class.
APPENDIX D: ASSESSMENT REPORT

The pre– and post– tests consist of 2 packages with 20 multiple choice questions in each package. One will be the pre– and post– test for the 101/103 courses and the second one for the 105 classes. The questions will assess students’ higher order thinking skills based on their knowledge and comprehension. The 105 post– test will be 40 questions and will include the 20 101/103 test questions. This will help to assess students’ retention of the materials covered in the 101/103 courses. The questions will be designed specifically to assess students’ ability to apply, analyze and synthesize the acquired knowledge. The content of the questions will be based on the Earth Science Literacy Principles.

- Associate Dean Comments and Completed Rubric
- Curriculum Map
- Geology Assessment and Supporting Document 2011 2012

Program follows specialized accreditation standards: □
Name of accrediting organization:
Date of last program review for the accrediting organization:
Related Items
There are no related items.

1: Identify, Describe, and Classify

Program Goal or SLO
identify, describe, and classify minerals, rocks and fossils; make scientific observations of these items in the field and in the laboratory; interpret their observations in a scientifically sound manner;

Assessment Method / Performance Expected
All geology majors who graduate with a BS must take mineralogy, paleontology, petrology, stratigraphy / sedimentology, structural geology, senior seminar, and field studies. With the exception of senior seminar, all classes have instituted a lab and field components. The field studies requirements separate the BS students from the BA students. Each class has a final project that requires identification, description, and classification skills and requires the student to interpret the data and observation. Field studies class has a final, capstone project that requires the students to demonstrate knowledge in goal 1 and goal 2. The department will collect a randomized number of projects to assess performance for this goal.
At least 90% of the students will score at least 70% on all five projects

**Assessment Results**

This is ongoing.

**Use of Results**

The changes to our current assessment methods resulted as a consequence of listening to recent senior exit interviews about our classes.

We increased the opportunities for our student to conduct ship board research. Three summer program enable students to conduct marine and aquatic research.

We increased the number of field opportunity for our students, and nearly, every 300 and 400 classes had field projects.

We continued to support field research in the western desert, Galapagos, Bahamas, and India.

The department funded student summer research.

**Budget Changes**

The increases in field experiences for our major classes resulted in more funds being reallocated to travel.

**Comments and Attachments**

1: Enhance the undergraduate academic core.

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**2: Summarize and Explain**

**Program Goal or SLO**

summarize and explain enormity of time, the history of the Earth and its processes, and the evolution of life as recorded in the fossil record

**Assessment Method / Performance Expected**

All geology majors who graduate with a BS must take mineralogy, paleontology, petrology, stratigraphy / sedimentology, structural
geology, senior seminar, and field studies. With the exception of senior seminar, all classes require a knowledge of earth history to complete the class successful. Each of these classes has a final project that will require a working knowledge of Goal 2 to complete. The department will collect a randomized number of projects to assess performance for this goal.

At least 90% of the students will score at least 70% on all five projects

**Assessment Results**

This is ongoing.

**Use of Results**

We will be offering a new type of paleontology course that will become a senior capstone class. This Spring 2015 class will be used to assess this goal.

**Budget Changes**

None

**Comments and Attachments**

**Related Items**

1: Enhance the undergraduate academic core.

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**3: Analyze Dependence**

**Program Goal or SLO**

analyze society’s dependence on Earth resources, the interaction between human activities and the natural environment, and the geological hazards faced by many communities;

**Assessment Method / Performance Expected**

Among the common courses that all geology majors take mineralogy, petrology, and stratigraphy / sedimentology provide the students with opportunities to learn about the items listed in this goal 3. These classes build on knowledge gained in the first semester geology class, which emphasizes hazards and resources. We also encourage students to take elective classes concerning global change, resources, and hazards. In senior seminar, students make presentations concerning current environmental concerns, and each of the elective environmental geology classes has a final project concern either hazards or resources. The department will collect a randomized
number of projects and senior presentation to assess performance for this goal. At least 90% of the students will score at least 70% on all projects.

**Assessment Results**

This is ongoing

**Use of Results**

In the fall 2013, the geology department taught an earth resources class that included mineral and petroleum resources.

The students want more global change information. We taught Geol 288, a global change class, in the spring 2014.

We will be adding more energy and global change topics in our introductory classes.

**Budget Changes**

None.

**Comments and Attachments**

**Related Items**

1: Enhance the undergraduate academic core.

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**Program Improvement Summary FY 2014**

**Summary of assessment results with focus on program improvement (to be shared publicly)**

The assessment effort proved to be a catalyst for the department to review its curriculum and teaching methods. We have engaged our students in reviewing our curriculum, and these discussions led us to develop a new course. In the fall, we offered an earth resources class that was equally divided between mineral and petroleum resources. The students want more global change information, and we taught Geol 288, a global change class, in the spring 2014. We will be adding more energy and global change topics to our introductory classes. The faculty has worked to increase the number of field opportunities for our students, and nearly, every 300 and 400 classes had field projects. We increased the opportunities for our
student to conduct shipboard research. Three-summer research program enable students to conduct marine and aquatic research. The department has field courses in the western desert, Galapagos, Bahamas, and India. We are changing paleontology course to be a senior capstone class. We are currently, reassessing the department course offerings to determine how well we are addressing the critical issues in geology.

**Related Items**
*There are no related items.*
Geology Minor

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)

Related Items
There are no related items.
Mathematics

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)

Related Items
There are no related items.
Mathematics - BA

Mathematics-BA
- **Program Name:** Mathematics
- **Program Type:** Undergraduate Degree
- **Start:** 7/1/2013
- **End:** 6/30/2014
- **Program Assessment Coordinator:** Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
- **Date of next program review:**

**Program/Department Mission Statement**
Mathematics is an art, a pure reflection of the human mind. Mathematics is the language of science. It provides powerful tools for understanding our world. Mathematical reasoning and the critical thinking skills that develop with the study of mathematics are foundational necessities for an educated workforce and citizenry in the 21st century. In support of these principles the Department of Mathematics will offer a varied curriculum with flexible programs. The Department will recruit a distinguished faculty of dedicated teacher-scholars who through teaching seek to impart mathematical knowledge, skills, and critical reasoning, as well as a sense for the utility and beauty of mathematics; and through scholarship will seek to fulfill the professional responsibility of expanding mathematical knowledge and applications, while providing students opportunities for original research. All mathematics courses, whether part of the general education core curriculum; degree requirements in the sciences, social sciences or business; or for mathematics majors, will have as a goal, a transformational learning experience. Students majoring in mathematics will benefit from small classes, personal attention, and a curriculum that allows for concentration in several key sub-disciplines and pre-professional tracks, preparing them for a variety of careers, further study at the graduate level, and the pursuit, for its own sake, of learning the oldest of the liberal arts.

**Unit or School Mission**
Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.

**Comments and Attachments**
- Associate Dean Comments and Completed Rubric
1: Model Phenomena

Program Goal or SLO
Using algebra, geometry, calculus, advanced calculus and abstract algebra courses, students model phenomena in mathematical terms.

Assessment Method / Performance Expected
Once each year embedded questions types will be used for exams in the target courses. The department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate. An average score of 75% will be considered acceptable.

Assessment Results
Results are for the new BA degree that began in Fall 2012. Currently, there were seven students in the program last fall and six this spring. Of those students, only one student showed up as being in one of the three target courses for assessment: Math 203-Linear Algebra, Math 221-Multivariable Calculus, Math 295-An Introduction to Abstract Mathematics. The one student took Math 295 during spring semester 2014. Student Learning Outcomes 1 and 2 (SLO 1 & 2) are necessarily connected and in some instances this report combines their assessment results. The performance of the one identified student from the BA program in Math 295-An Introduction to Abstract Mathematics was assessed, since this was the only target course where students in the BA program could be identified. For SLO 1 the mean score was 100% from a population of size 1. This exceeds our benchmark of 75%.

Use of Results
At this point, the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Since only one student was in the sample, the basis for discussion will be last year’s results as well. Last year the results for
SLO 1 was 88% and this year 100%. Both are above the benchmark of 75%. One major issue for discussion will be the need to recruit more students for the BA degree in mathematics. In the context of past performance and ongoing assessment of our programs, we modified our track roadmaps to take advantage of course proximity that would, in our judgement, increase student achievement of learning outcomes.

Budget Changes
None anticipated at this point.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

2: Applying Models

Program Goal or SLO
Using algebra, geometry, calculus and other track-appropriate sub-disciplines of mathematics, students will be able to derive correct answers to challenging questions by applying the models from Learning Outcome 1.

Assessment Method / Performance Expected
Once each year embedded questions types will be used for exams in the target courses. The department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate. An average score of 75% will be considered acceptable.

Assessment Results
Results are for the new BA degree that began in Fall 2012. Currently, there were seven students in the program last fall and six this spring. Of those students, only one student showed up as being in one of the three target courses for assessment: Math 203-Linear Algebra, Math 221-Multivariable Calculus, Math 295-An Introduction
to Abstract Mathematics. The one student took Math 295 during spring semester 2014. Student Learning Outcomes 1 and 2 (SLO 1 & 2) are necessarily connected and in some instances this report combines their assessment results. The performance of the one identified student from the BA program in Math 295-An Introduction to Abstract Mathematics was assessed, since this was the only target course where students in the BA program could be identified. For SLO 2 the mean score was 100% from a population of size 1. This exceeds our benchmark of 75%.

**Use of Results**
At this point, the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Since only one student was in the sample, the basis for discussion will be last year’s results as well. Last year the results for SLO 2 was 88% and this year 100%. Both are above the benchmark of 75%. One major issue for discussion will be the need to recruit more students for the BA degree in mathematics. In the context of past performance and ongoing assessment of our programs, we modified our track roadmaps to take advantage of course proximity that would, in our judgement, increase student achievement of learning outcomes.

**Budget Changes**
None anticipated at this point.

**Comments and Attachments**

**Related Items**

1: Enhance the undergraduate academic core.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

3: Write Arguments

**Program Goal or SLO**
Students will be able to write complete, grammatically and logically
correct arguments to prove their conclusions.

**Assessment Method / Performance Expected**
Once each year embedded questions types will be used for exams in the target courses. The department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate. An average score of 75% will be considered acceptable.

**Assessment Results**
Results are for the new BA degree that began in Fall 2012. Currently, there were seven students in the program last fall and six this spring. Of those students, only one student showed up as being in one of the three target courses for assessment: Math 203-Linear Algebra, Math 221-Multivariable Calculus, Math 295-An Introduction to Abstract Mathematics. The one student took Math 295 during spring semester 2014. The performance of the one identified student from the BA program in Math 295-An Introduction to Abstract Mathematics was assessed, since this was the only target course where students in the BA program could be identified. For SLO 3 the mean score was 100% from a population of size 1. This exceeds our benchmark of 75%.

**Use of Results**
At this point, the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Since only one student was in the sample, the basis for discussion will be last year's results as well. Last year the results for SLO 3 was 74% and this year 100%. Last year's result was below the benchmark of 75%, and this year it was above. Clearly what is needed is more data. We will discuss this and monitor future performance. One major issue for discussion will be the need to recruit more students for the BA degree in mathematics. In the context of past performance and ongoing assessment of our programs, we modified our track roadmaps to take advantage of course proximity that would, in our judgement, increase student achievement of learning outcomes.

**Budget Changes**
None anticipated at this point.

**Comments and Attachments**
**Related Items**

1: Enhance the undergraduate academic core.
10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
The BA program in mathematics is new, having started in fall 2012. The program has grown from 5 students last year to seven in fall of 2013 and six in spring 2014. Performance has met or exceeded benchmarks except for being below the benchmark by one percentage point last year for SLO 3. Although this appears to be reasonably good performance, the sample is very small (this year only one student was found to have taken any of the three target courses). When the assessment committee convenes in the fall we will discuss improving recruitment for the BA program, as well as whether we should modify the target courses.

Related Items
There are no related items.
Mathematics - BS

Mathematics - BS
Program Name: Mathematics
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator:
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
Date of next program review: 2018

Program/Department Mission Statement
Mathematics is an art, a pure reflection of the human mind. Mathematics is the language of science. It provides powerful tools for understanding our world. Mathematical reasoning and the critical thinking skills that develop with the study of mathematics are foundational necessities for an educated workforce and citizenry in the 21st century. In support of these principles the Department of Mathematics will offer a varied curriculum with flexible programs. The Department will recruit a distinguished faculty of dedicated teacher-scholars who through teaching seek to impart mathematical knowledge, skills, and critical reasoning, as well as a sense for the utility and beauty of mathematics; and through scholarship will seek to fulfill the professional responsibility of expanding mathematical knowledge and applications, while providing students opportunities for original research. All mathematics courses, whether part of the general education core curriculum; degree requirements in the sciences, social sciences or business; or for mathematics majors, will have as a goal, a transformational learning experience. Students majoring in mathematics will benefit from small classes, personal attention, and a curriculum that allows for concentration in several key sub-disciplines and pre-professional tracks, preparing them for a variety of careers, further study at the graduate level, and the pursuit, for its own sake, of learning the oldest of the liberal arts.

Unit or School Mission
Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.

Comments and Attachments
Note: In the future we request that the expected performance be changed to 75% from 80%, since we learned that 75% is a more typical level of expected performance used for assessment
purposes. In addition, we only sampled math majors in the calculus sequence. Most science and math majors place into a math course beyond introductory calculus and many students who take introductory calculus and become math majors do not declare until after they had at least introductory calculus. For this reason we are considering sampling beyond just math majors for the calculus sequence.

General Education Competencies
Currently all mathematics courses above Math 101 College Algebra, count for the general education math/logic requirement and all satisfy the Mathematical Reasoning and Analysis competency.

- Associate Dean Comments and Completed Rubric
- MATH BS Curriculum Map
- MATH BS Report and Supporting Docs 2011 2012

Program follows specialized accreditation standards: ✓
Name of accrediting organization: NCATE for teacher education track
Date of last program review for the accrediting organization: 2011
Related Items
There are no related items.

1: Model Phenomena

Program Goal or SLO
Using algebra, geometry, calculus and other track-appropriate sub-disciplines of mathematics, students model phenomena in mathematical terms.

Assessment Method / Performance Expected
Once each year embedded questions types will be used for exams in the target courses, selecting two tracks per year on a rotating basis. The department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate. An average score of 75% will be considered acceptable.

Assessment Results
Results are for the Pure and Applied Tracks within the BS degree. Student Learning Outcomes 1 and 2 (SLO 1 & 2) are necessarily connected and in some instances this report combines
their assessment results. The performance of each identified student from the Pure and Applied Tracks in Math 203-Linear Algebra, Math 221-Multivariable Calculus, Math 295-An Introduction to Abstract Mathematics, Math 323-Differential Equations, Math 401-Introduction to Point Set Topology, Math 411-Advanced Calculus II, Math 415-Complex Analysis, Math 423-Introduction to Partial Differential Equations, and Math 470 Mathematical Modeling were assessed, for a total of 53 individual exams. For SLO 1 the mean score was 87.7%. This exceeds our benchmark.

**Use of Results**
At this point the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, and hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Although the acceptable results are encouraging, we will continue to monitor performance and continue to consider course modifications and redesign based on a broader view of our programs, taking these assessment results into consideration. In the context of past performance and ongoing assessment of our programs, we modified our track roadmaps to take advantage of course proximity that would, in our judgement, increase student achievement of learning outcomes.

**Budget Changes**
None anticipated at this point.

**Comments and Attachments**

**Related Items**

1. Enhance the undergraduate academic core.

10. Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

**2: Applying Models**

**Program Goal or SLO**
Using algebra, geometry, calculus and other track-appropriate sub-
disciplines of mathematics, students derive correct answers to challenging questions by applying the models from Learning Outcome 1.

Assessment Method / Performance Expected
Once each year embedded questions types will be used for exams in the target courses, selecting two tracks per year on a rotating basis. The department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate. An average score of 75% will be considered acceptable.

Assessment Results
Results are for the Pure and Applied Tracks within the BS degree. Student Learning Outcomes 1 and 2 (SLO 1 & 2) are necessarily connected and in some instances this report combines their assessment results. The performance of each identified student from the Pure and Applied Tracks in Math 203-Linear Algebra, Math 221-Multivariable Calculus, Math 295-An Introduction to Abstract Mathematics, Math 323-Differential Equations, Math 401-Introduction to Point Set Topology, Math 411-Advanced Calculus II, Math 415-Complex Analysis, Math 423-Introduction to Partial Differential Equations, and Math 470 Mathematical Modeling were assessed, for a total of 53 individual exams. For SLO 2 the mean score was 87.7%. This exceeds our benchmark.

Use of Results
At this point the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, and hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Although the acceptable results are encouraging, we will continue to monitor performance and continue to consider course modifications and redesign based on a broader view of our programs, taking these assessment results into consideration. In the context of past performance and ongoing assessment of our programs, we modified our track roadmaps to take advantage of course proximity that would, in our judgement, increase student achievement of learning outcomes.

Budget Changes
None anticipated at this point.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.
APPENDIX D: ASSESSMENT REPORT

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

3: Write Arguments

**Program Goal or SLO**
Students write complete, grammatically and logically correct arguments to prove their conclusions.

**Assessment Method / Performance Expected**
Once each year embedded questions types will be used for exams in the target courses, selecting two tracks per year on a rotating basis. The department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate. An average score of 75% will be considered acceptable.

**Assessment Results**
Results are for the Pure and Applied Tracks within the BS degree. The performance of each identified student from the Pure and Applied Tracks in Math 203-Linear Algebra, Math 295-An Introduction to Abstract Mathematics, Math 401-Introduction to Point Set Topology, Math 411-Advanced Calculus II, Math 415-Complex Analysis, Math 423-Introduction to Partial Differential Equations, and Math 470 Mathematical Modeling were assessed, for a total of 36 individual exams. For SLO 3 the mean score was 84.1%. This exceeds our benchmark.

**Use of Results**
At this point the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, and hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Although the acceptable results are encouraging, we will continue to monitor performance and continue to consider course modifications and redesign based on a broader view of our programs, taking these assessment results into consideration. In the context of past performance and ongoing assessment of our programs, we modified our track roadmaps to take advantage of course proximity that would, in our judgement, increase student achievement of learning outcomes.

**Budget Changes**
None anticipated at this point.

**Comments and Attachments**

Please note that Math 221-Multivariable Calculus and Math 323-Differential Equations were only assessed for SLO 1 and 2, since SLO 3 assesses proof writing. Neither Math 221 nor 323 typically involves proofs, hence both courses are considered inappropriate for the assessment of proof writing.

**Related Items**

1: Enhance the undergraduate academic core.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

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**Program Improvement Summary FY 2014**

Summary of assessment results with focus on program improvement (to be shared publicly)

This year two of the five tracks within the BS degree in Mathematics were assessed: the Pure track and the Applied track. Next year the other three tracks will be assessed. Although assessment results have consistently shown that our student performance in the three learning outcomes are exceeding benchmarks, we are nevertheless seeking ways to enhance student achievement of the learning outcomes. One way, as mentioned earlier, is in the careful and continued analysis of the track roadmaps. By taking courses at optimal times, the likelihood of optimal performance can be enhanced. We recently completed a revision of our roadmaps. We also continue to evaluate our choice of courses populating our tracks for currency, appropriateness and impact.

**Related Items**

*There are no related items.*
Mathematics - Minor

Mathematics-Minor
Program Name: Mathematics
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator:
Administrative Unit Director receiving assessment updates:
Date of next program review:

Program/Department Mission Statement
Mathematics is an art, a pure reflection of the human mind. Mathematics is the language of science. It provides powerful tools for understanding our world. Mathematical reasoning and the critical thinking skills that develop with the study of mathematics are foundational necessities for an educated workforce and citizenry in the 21st century. In support of these principles the Department of Mathematics will offer a varied curriculum with flexible programs. The Department will recruit a distinguished faculty of dedicated teacher-scholars who through teaching seek to impart mathematical knowledge, skills, and critical reasoning, as well as a sense for the utility and beauty of mathematics; and through scholarship will seek to fulfill the professional responsibility of expanding mathematical knowledge and applications, while providing students opportunities for original research. All mathematics courses, whether part of the general education core curriculum; degree requirements in the sciences, social sciences or business; or for mathematics majors, will have as a goal, a transformational learning experience. Students minoring in mathematics will benefit from small classes, personal attention, and a curriculum that provides a foundation in core mathematics courses allowing for either flexibility with mathematics electives in pursuit of learning the oldest of the liberal arts, or concentration in pre-actuarial studies, laying a foundation for further study that can prepare for a career as an actuary.

Unit or School Mission
Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.

Comments and Attachments
Program follows specialized accreditation standards: ☐
Name of accrediting organization:
Date of last program review for the accrediting organization:
Related Items
There are no related items.

1: Model Phenomena

Program Goal or SLO
Using algebra, geometry, calculus, students model phenomena in mathematical terms.

Assessment Method / Performance Expected
Once each year embedded questions types will be used for exams in the target courses. The department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate. An average score of 75% will be considered acceptable.

Assessment Results
Results for the Minor in Mathematics follow. Student Learning Outcomes 1 and 2 (SLO 1 & 2) are necessarily connected and in some instances this report combines their assessment results. The performance of each identified student from the Minor in Mathematics in Math 203-Linear Algebra, were assessed, for a total of 16 students. For SLO 1 the mean score was 77.7%. This exceeds our benchmark.

Use of Results
At this point, the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Last year's results will be considered as well this year's. Last year the results for SLO 1 was 77% and this year 77.7%. Both are above the benchmark of 75%, but nevertheless there is room for improvement.

Although the acceptable results are encouraging, we will continue to monitor performance and continue to consider course modifications and redesign based on a broader view of our programs, taking these assessment results into consideration. In the context of past performance and ongoing assessment of our programs, we modified our track roadmaps to take advantage of course proximity that would, in our judgement, increase student achievement of learning
outcomes.

**Budget Changes**
None anticipated at this point.

**Comments and Attachments**
**Related Items**

1. Enhance the undergraduate academic core.

10. Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

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**2: Applying Models**

**Program Goal or SLO**
Using algebra, geometry, calculus students derive correct answers to challenging questions by applying the models from Learning Outcome 1.

**Assessment Method / Performance Expected**
Once each year embedded questions types will be used for exams in the target courses. The department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate. An average score of 75% will be considered acceptable.

**Assessment Results**
Results for the Minor in Mathematics follow. Student Learning Outcomes 1 and 2 (SLO 1 & 2) are necessarily connected and in some instances this report combines their assessment results. The performance of each identified student from the Minor in Mathematics in Math 203-Linear Algebra, were assessed, for a total of 16 students. For SLO 2 the mean score was 77.7%. This exceeds our benchmark.
Use of Results

At this point, the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Last year's results will be considered as well this year's. Last year the results for SLO 2 was 77% and this year 77.7%. Both are above the benchmark of 75%, but nevertheless there is room for improvement.

Although the acceptable results are encouraging, we will continue to monitor performance and continue to consider course modifications and redesign based on a broader view of our programs, taking these assessment results into consideration. In the context of past performance and ongoing assessment of our programs, we modified our track roadmaps to take advantage of course proximity that would, in our judgement, increase student achievement of learning outcomes.

Budget Changes
None anticipated at this point.

Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
Although assessment results have consistently shown that our student performance in the two learning outcomes are exceeding benchmarks, we are nevertheless seeking ways to enhance student achievement of the learning outcomes. One way, as mentioned
earlier, is in the careful and continued analysis of the roadmaps. By taking courses at optimal times, the likelihood of optimal performance can be enhanced. We recently completed a revision of our roadmaps. We also continue to evaluate our choice of courses populating our minor for currency, appropriateness and impact.

**Related Items**
*There are no related items.*
Mathematics - MS

Mathematics - MS
Program Name: Mathematics
Program Type: Graduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator:
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
Date of next program review:

Program/Department Mission Statement
Mathematical reasoning and the critical thinking skills that develop with the study of mathematics are foundational necessities for an educated workforce and citizenry in the 21st century. In support of this principle, the goal of the graduate program in mathematics is to increase the level of mathematical skills and literacy within our community, state and region. To accomplish this, the Department of Mathematics recruited an enthusiastic faculty, active in research and dedicated to sharing their understanding with those students possessing the ability and desire to learn. The Program offers Lowcountry residents their only opportunity for high-quality education in graduate mathematics needed in industry and post-secondary education.

Unit or School Mission
Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.

Comments and Attachments
Program follows specialized accreditation standards: ☐
Name of accrediting organization:
Date of last program review for the accrediting organization:
Related Items
There are no related items.

1: Advanced Linear Algebra
Program Goal or SLO
Students demonstrate a high level of mastery in Advanced Linear Algebra, the one graduate course required of all candidates for the Master of Science in Mathematics.

**Assessment Method / Performance Expected**
The grades for Advanced Linear Algebra will be analyzed each year. Since each year Advanced Linear Algebra has one instructor and the objectives, materials and assessments are consistent, the grades for the course reflect the measure of this outcome. An average grade of 75% will be considered acceptable.

**Assessment Results**
The mean grade for Math 502-Advanced Linear Algebra, the one graduate course required of all candidates for the Master of Science in Mathematics was 85%, exceeding the benchmark set for SLO 1.

**Use of Results**
At this point, the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Last year's results will be considered as well this year's. Last year the results for SLO 1 was 75% and this year 85%. Although there has been improvement, nevertheless there is room for improvement.

**Budget Changes**
None anticipated at this point, however more financial support for graduate assistantships would make us more competitive with our peer institutions in recruiting graduate students. This, in turn, would allow us to effectively institute needed innovations in our foundational mathematics courses such as College Algebra and Pre-calculus, gateways to STEM careers.

**Comments and Attachments**

**Related Items**

2: Develop nationally recognized graduate programs.

3: Develop and retain a highly qualified and diverse faculty and staff.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate
APPENDIX D: ASSESSMENT REPORT

and graduate programs.

2: Basic Areas of Graduate Mathematics

Program Goal or SLO
Students demonstrate a high level of mastery in one of the basic areas of graduate mathematics: Algebra or Analysis.

Assessment Method / Performance Expected
Once each year embedded question types will be used for exams in Applied Algebra, Real Analysis and Complex Analysis. The department chair will choose and evaluate a statistically designed random sample. An average score of 75% will be considered acceptable.

Assessment Results
Courses used in the assessment were Math 503-Advanced Linear Algebra, Math 511-Real Analysis, and Math 515-Complex Variables. All graduate students in these courses were assessed. For SLO 2 the average score on the embedded question type for a population of 17 was 75%, exactly at the benchmark of 75%.

Use of Results
At this point, the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Last year's results will be considered as well this year's. Last year the results for SLO 2 was 73% and this year 75%. Although there has been slight improvement, nevertheless there is room for improvement.

Budget Changes
None anticipated at this point, however more financial support for graduate assistantships would make us more competitive with our peer institutions in recruiting graduate students. This, in turn, would allow us to effectively institute needed innovations in our foundational mathematics courses such as College Algebra and Pre-calculus, gateways to STEM careers.

Comments and Attachments
Related Items

2: Develop nationally recognized graduate programs.
3: Develop and retain a highly qualified and diverse faculty and staff.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

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3: Employment

**Program Goal or SLO**
Graduates of the program are expected to find suitable employment in industry, K-12 education, post-secondary education, or will continue graduate study.

**Assessment Method / Performance Expected**
A survey question concerning current employment or study will be placed on the form sent to recent graduates of the program that are already solicited for tenure and promotion. If at least 75% of those responding are working in industry, teaching mathematics or continuing in graduate or professional school, this will be considered acceptable.

**Assessment Results**
Using the most recent survey of recent graduates from our Master's Degree program, of 9 responding, all 9 were either attending graduate school (1), teaching high school (2), teaching at an institution of higher education (3), or were employed in industry in a capacity that directly involved mathematics (3), yielding a 100% rate of employment or graduate school. This exceeds the benchmark of 75%.

**Use of Results**
The Department of Mathematics is pleased with the success of its graduates from the Master's Degree in Mathematics and will use these results to make that case for the value of a Master's Degree in Mathematics from College of Charleston.

**Budget Changes**
None anticipated at this point, however more financial support for graduate assistantships would make us more competitive with our peer institutions in recruiting graduate students. This, in turn, would allow us to effectively institute needed
innovations in our foundational mathematics courses such as College Algebra and Precalculus, gateways to STEM careers.

Comments and Attachments
Related Items

2: Develop nationally recognized graduate programs.

3: Develop and retain a highly qualified and diverse faculty and staff.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
The Department of Mathematics is pleased with the improvements in performance and the success of its graduates from the Master's Degree in Mathematics and will use these results to make that case for the value of a Master's Degree in Mathematics from College of Charleston, however we will continue to seek ways to improve recruitment of students and to enhance their program of study in order to prepare them for either further graduate work or careers in teaching or industry.

Related Items
There are no related items.
Operations Research - Certificate

Operations Research Graduate Certificate

Program Name: Mathematics
Program Type: Other
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Department Chair (Mignone, Robert)
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)
Date of next program review:

Program/Department Mission Statement
The graduate certificate program in Operations Research allows non-degreee students to strengthen their expertise in operations research while recognizing them with an official certificate of their achievement. The program combines a solid theoretical foundation with a variety of applied tools and techniques to prepare the student to handle problems in business and industry.

Unit or School Mission
Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.

Comments and Attachments
Program follows specialized accreditation standards: ☐
Name of accrediting organization:
Date of last program review for the accrediting organization:
Related Items
There are no related items.

1: Modeling Phenomena

Program Goal or SLO
Students model phenomena using operations research modeling techniques.

Assessment Method / Performance Expected
Once each year embedded question types will be used for exams in
either Advanced Linear Algebra, Linear Programming and Optimization or Operations Research. The department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate. An average score of 75% will be considered acceptable.

Assessment Results
Student Learning Outcomes 1 and 2 (SLO 1 & 2) are necessarily connected and this report combines their assessment results. The designated courses used to assesses the Certificate Program in Operations Research are Math 502-Advanced Linear Algebra, Math 551-Linear Programming and Optimization or Math 552-Operations Research. No students from the Operations Research Certificate Program were identified in Math 502 or 552. However one student from the program was identified in Math 551. The score for SLO 1 in Math 551 was 95%, exceeding the benchmark of 75%.

Use of Results
At this point, the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Since only one student was in the sample, the basis for discussion will be last year's results as well. Last year the results for SLO 1 was 83% and this year 85%. Both are above the benchmark of 75%. One major issue for discussion will be the need to recruit more students for the OR Certificate program.

Budget Changes
None anticipated at this point.

Comments and Attachments
It should be noted that for SLO 1 it was decided that using student performance on the entire final exam rather than performance on a specific embedded question type was most useful for us to assess the learning objectives of the program. The assessment method for SLO 1 will be modified in the future to reflect this evolution in our thinking.

Related Items

2: Develop nationally recognized graduate programs.

3: Develop and retain a highly qualified and diverse faculty and staff.
10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

2: Applying Models

**Program Goal or SLO**

Students model phenomena using operations research modeling techniques.

**Assessment Method / Performance Expected**

Once each year embedded question types will be used for exams in either Advanced Linear Algebra, Linear Programming and Optimization or Operations Research. The department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate. An average score of 75% will be considered acceptable.

**Assessment Results**

Student Learning Outcomes 1 and 2 (SLO 1 & 2) are necessarily connected and this report combines their assessment results. The designated courses used to assess the Certificate Program in Operations Research are Math 502-Advanced Linear Algebra, Math 551-Linear Programming and Optimization or Math 552-Operations Research. No students from the Operations Research Certificate Program were identified in Math 502 or 552. However, one student from the program was identified in Math 551. The score for SLO 2 in Math 551 was 95%, exceeding the benchmark of 75%.

**Use of Results**

At this point, the results from Spring 2014 were only just received and the data for fiscal year 2014 assessed, hence only the Math Dept Chair viewed the results. The Math Dept Chair will discuss the results with the departmental assessment committee when it reconvenes in the fall. Since only one student was in the sample, the basis for discussion will be last year's results as well. Last year the results for SLO 2 was 83% and this year 85%. Both are above the benchmark of 75%. One major issue for discussion will be the need to recruit more students for the OR Certificate program.

**Budget Changes**

None anticipated at this point.

**Comments and Attachments**
It should be noted that for SLO 2 it was decided that using student performance on the entire final exam rather than performance on a specific embedded question type was most useful for us to assess the learning objectives of the program. The assessment method for SLO 2 will be modified in the future to reflect this evolution in our thinking.

Related Items

2: Develop nationally recognized graduate programs.

3: Develop and retain a highly qualified and diverse faculty and staff.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
The Certificate Program in Operations Research is new. The program has only a few students in it and this year we were able to identify only one student in the target courses. Performance has exceeded benchmarks. Although this appears to be reasonably good performance, the sample is very small. When the assessment committee convenes in the fall we will discuss improving recruitment for both certificate programs.

Related Items
There are no related items.
Statistics - PBCert

Statistics Graduate Certificate

Program Name: Mathematics  
Program Type: Other  
Start: 7/1/2013  
End: 6/30/2014  
Program Assessment Coordinator: Department Chair (Mignone, Robert)  
Administrative Unit Director receiving assessment updates: Dean (Auerbach, Michael), Associate Dean (Deavor, James)

Date of next program review:

Program/Department Mission Statement
The Graduate Certificate Program in Statistics allows non-degree students to strengthen their expertise in applied statistics while recognizing them with an official certificate of their achievement. The program combines a solid theoretical foundation with a variety of applied tools and techniques to prepare the student to handle statistical problems in business and industry.

Unit or School Mission
Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.

Comments and Attachments
Program follows specialized accreditation standards:  
Name of accrediting organization:  
Date of last program review for the accrediting organization:  
Related Items
There are no related items.

1: Model Phenomena

Program Goal or SLO
Students model phenomena using statistical modeling techniques.

Assessment Method / Performance Expected
Once each year embedded question types will be used for exams in either Mathematical Statistics I or II or Linear Models. The
department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate. An average score of 75% will be considered acceptable.

**Assessment Results**

This year, no students from the Certificate Program in Statistics were identified in any of the target courses.

**Use of Results**

This year, no students from the Certificate Program in Statistics were identified in any of the target courses.

**Budget Changes**

None anticipated at this point.

**Comments and Attachments**

**Related Items**

- **2: Develop nationally recognized graduate programs.**

- **3: Develop and retain a highly qualified and diverse faculty and staff.**

- **10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.**

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**2: Applying Models**

**Program Goal or SLO**

Students derive correct answers to challenging questions by applying the models from Learning Outcome 1.

**Assessment Method / Performance Expected**

Once each year embedded question types will be used for exams in either Mathematical Statistics I or II or Linear Models. The department chair will choose and evaluate a statistically designed random sample, when using the entire population is not appropriate.
An average score of 75% will be considered acceptable.

**Assessment Results**
This year, no students from the Certificate Program in Statistics were identified in any of the target courses.

**Use of Results**
This year, no students from the Certificate Program in Statistics were identified in any of the target courses.

**Budget Changes**
None anticipated at this point.

**Comments and Attachments**

**Related Items**

2: Develop nationally recognized graduate programs.

3: Develop and retain a highly qualified and diverse faculty and staff.

10: Pursue national recognition for the College of Charleston’s personalized liberal arts and sciences education and for distinctive features of its undergraduate and graduate programs.

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**Program Improvement Summary FY 2014**

**Summary of assessment results with focus on program improvement (to be shared publicly)**
When the assessment committee convenes in the fall we will discuss improving recruitment for both certificate programs.

**Related Items**
There are no related items.
Physics and Astronomy

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)

Related Items

There are no related items.
Astronomy - BA/Minor

Astronomy - BA
Program Name: Astronomy
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Associate Professor (Fragile, Chris), Dep Narayanan
Administrative Unit Director receiving assessment updates: Dean (Auerb (Deavor, James)
Date of next program review:

Program/Department Mission Statement
The primary emphasis of the Department of Physics and Astronomy at the College is teaching within a liberal arts environment. Our course offerings, research programs, and outreach activities are centered on the needs of students. We strive to serve the greater Charleston community including outreach activities to pre-college teachers and students and to the general public. We place a strong emphasis on undergraduate research as a major component of a science education, combining experimental and theoretical physics in various specialized subfields of traditional physics.

The Astronomy BA degree is designed for students who plan to pursue careers in other non-technical fields. The emphasis is development of life-long learners with communication skills who can apply the basic principles of astronomy to societal issues.

Goals for graduates of this program include

1. Students have a good command of basic astronomy knowledge for careers in non-technical fields.
2. Students are life-long learners who are capable of critical thinking and applying principles to real-life issues.

Student Learning Outcomes include

1. Students are able to answer general questions in the field of astronomy. [Astronomy.]
2. Students use critical thinking and apply astronomy-related knowledge to practical problems.
3. Students effectively communicate in scientific discussions and presentations.

Unit or School Mission
“Our vision is to be a community of teacher-scholars committed to creating an atmosphere of excellence that supports and nurtures students as scholars and encourages learning within the framework of a broad liberal arts and sciences education.”

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
- Accountability and assessment as key tools to drive continuous improvement

http://ssm.cofc.edu/pv_obj_cache/pv_obj_id_7783D7ED33B75FDD03E23C1D76217092/StrategicPlan-S09%20GP.pdf

Our bumper sticker mission is "Integrating discovery, innovation and education and our nation."

Comments and Attachments

- Associate Dean Comments and Completed Rubric
- Astronomy Report and Supporting Documents 2011 2012

Program follows specialized accreditation standards: 
Name of accrediting organization: 
Date of last program review for the accrediting organization: 

Related Items
There are no related items.

Astronomy Minor
Program Name: Astronomy Minor
Program Type: Other
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Associate Professor (Fragile, Chris), Dep Narayanan)
Administrative Unit Director receiving assessment updates: Associate Dean
Date of next program review:

Program/Department Mission Statement
The primary emphasis of the Department of Physics and Astronomy at the College teaching within a liberal arts environment. Our course offerings, research programs centered on the needs of students. We strive to serve the greater Charleston community including outreach activities to pre-college teachers and students and to the general public. There is a strong emphasis on undergraduate research as a major component of a science degree.
combination of experimental and theoretical physics in various specialized subfields of traditional physics.

The Astronomy Minor is designed for students who plan to pursue careers in technical or non-technical fields. The emphasis is development of life-long learners with excellent communication skills who can apply the basic principles of astronomy to social issues.

Goals for students in this program include

1. Students have a good command of basic astronomy knowledge for career in technical fields.
2. Students are life-long learners who are capable of critical thinking and applying principles to real-life issues.

Student Learning Outcomes include

1. Students are able to answer general questions in the field of astronomy.
2. Students use critical thinking and apply astronomy-related knowledge to
3. Students effectively communicate in scientific discussions and presentations.

**Unit or School Mission**

“Our vision is to be a community of teacher-scholars committed to creating an environment of excellence that supports and nurtures students as scholars and encourages learning at the framework of a broad liberal arts and sciences education.”

**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
- Accountability and assessment as key tools to drive continuous improvement

http://ssm.cofc.edu/pv_obj_cache/pv_obj_id_7783D7ED33B75FDD03E23C1D7StrategicPlan-S09%20GP.pdf

Our bumper sticker mission is "Integrating discovery, innovation and education for the good of our students and our nation."

**Comments and Attachments**

**Program follows specialized accreditation standards:**

**Name of accrediting organization:**

**Date of last program review for the accrediting organization:**

**Related Items**

There are no related items.
4: Astronomy Knowledge

**Program Goal or SLO**
Students answer a range of questions in the field of astronomy.

**Assessment Method / Performance Expected**
A test containing 25 questions covering basic astronomy content will be used to assess astronomy knowledge for students in the BA Astronomy and Astronomy Minor programs.

The test will be given to graduating seniors in the BA Astronomy and Astronomy Minor programs.

The test will be compiled by astronomy professors. The test will be secured and copies will not be released to students.

Students are expected to answer 75% of the questions correctly.

**Assessment Results**
Only 1 student completed the Astronomy Minor program this year, and no BA students. Therefore, only 1 student was assessed. A 25 question test was administered to that student. A copy of the test is attached.

The student missed questions 1, 2, 6, 7, 8, 13, 15, and 16, thus scoring a 68%, somewhat below our goal. Interestingly, the student self-reported the questions on which he guessed (1, 5, 6, 7, and 8). Most of the ones he guessed on he missed, although question 5 he got right even though he guessed. This suggests his mastery of the material was, perhaps, even a bit weaker than the 68% would suggest.

Many of the questions the student missed had to do with the motion and positions of planets and their satellites. This suggests a deficiency in the student's knowledge of basic orbital mechanics or in the ability to make deductions based on that knowledge. Also troubling is that the student missed the question on ranking astronomical distance scales.

**Use of Results**
It is not really realistic to make an assessment of a whole program based on the performance of a single student on a test. If we must draw a conclusion from this single datum, then it would be that the Astronomy Minor program should put more emphasis on basic orbital mechanics. At present, exposure to this topic comes mostly from the first semester General Education Introductory Astronomy course (ASTR 129), although beginning next year students may also learn this topic in Introduction to Astrophysics (ASTR 231). However, more
data should be collected before firm conclusions and program recommendations are made.

**Budget Changes**
There are no budget changes.

**Comments and Attachments**

- [Astronomy Knowledge Test](#)

**Related Items**

1. **Enhance the undergraduate academic core.**

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**5: Written scientific communication**

**Program Goal or SLO**
Students communicate effectively in written works involving scientific concepts.

**Assessment Method / Performance Expected**
For Astro BA students, written communication skills will be assessed through their capstone research report, carried out through PHYS 420 or PHYS 499. For Astro Minor students, written communication skills will be evaluated from a writing assignment that will be collected from one of the elective courses included in the Astro Minor. Within the individual courses, the writing may be assigned as either homework or part of an exam.

The writing assessment is based on the attached rubric taken from the Purdue University College of Science. Evaluated measures include:

1. Content
2. Appropriateness
3. Organization/Clarity
4. Completeness
5. Grammar/Mechanics
6. Documentation
7. Creativity

Each measure is evaluated on a 4 point scale corresponding to
Beginning (1), Developing (2), Proficient (3), and Mastery (4). The performance expected for success is that 80% of the students will have an average score of Proficient or better.

**Assessment Results**
No Astro BA students completed capstone research projects within the past year. Three Astro Minor students completed elective courses within the past year. The results of the writing assessment are:

1 2 3 4 5 6 7  
Student 1: 3 4 4 4 4 4 4 Average = 3.9 (Proficient/Mastery)  
Student 2: 4 4 4 2 1 4 Average = 3.3 (Proficient/Mastery)  
Student 3: 4 4 4 4 2 4 4 Average = 3.7 (Proficient/Mastery)  

1=Content  
2=Appropriateness  
3=Organization/Clarity  
4=Completeness  
5=Grammar/Mechanics  
6=Documentation  
7=Creativity  

All three students received an average score of Proficient or better. Among the individual sub-categories, only Grammar/Mechanics resulted in an average score below Proficient (2.7 versus 3=Proficient).

**Use of Results**
While only three Astro Minor students and zero Astro BA students were assessed, the limited results indicated that students in this category are meeting or exceeding expectations for effective communication in written works involving scientific concepts. Of the 7 individual rubrics, only one – Grammar/Mechanics – had an average score below the Proficient level (2.7 versus 3=Proficient). This suggests that it is an area that students may improve upon, compared to other areas. But given the limited sample size, and the rubric’s closeness in score to the Proficient level, it is premature to identify Grammar/Mechanics as an area that falls short of department standards.

**Budget Changes**

**Comments and Attachments**
Related Items

1: Enhance the undergraduate academic core.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)

Related Items
There are no related items.
Astrophysics - BS

**Program Name:** Astrophysics  
**Program Type:** Undergraduate Degree  
**Start:** 7/1/2013  
**End:** 6/30/2014  
**Program Assessment Coordinator:** Associate Professor (Fragile, Chris), Dep Narayanan  
**Administrative Unit Director receiving assessment updates:** Dean (Auerb (Deavor, James)  
**Date of next program review:**

**Program/Department Mission Statement**

The primary emphasis of the Department of Physics and Astronomy at the College is teaching within a liberal arts environment. Our course offerings, research programs, and outreach efforts are all centered on the needs of students. We strive to serve the greater Charleston community, including outreach activities to pre-college teachers and students and to the general public. We place a strong emphasis on undergraduate research as a major component of a science education. Our curriculum is a combination of experimental and theoretical physics in various specialized subfields of traditional physics.

The Astrophysics BS degree is designed to prepare students for success in graduate study or technical employment in the astrophysics field. The emphasis is excellence in computational skills as well as oral and written scientific communication skills.

**Goals for graduates of this program include**

1. Students will be prepared for success in graduate study or technical employment.  
2. Students will have excellent computational and experimental skills in observational astrophysics. They will be expert and creative in experimental design.  
3. Students will have good oral and written scientific communication skills.

**Student Learning Outcomes include**

1. Students apply classical and relativistic motion principles correctly in astrophysics [unique to the BS in Astrophysics]  
2. Students are able to answer questions on the level of the Physics GRE.  
3. Students demonstrate competency in scientific communication (written and oral).  
4. Students apply a range of experimental and computational techniques to real-world problems.

**Unit or School Mission**

**Vision**
“Our vision is to be a community of teacher-scholars committed to creating an excellence that supports and nurtures students as scholars and encourages learning framework of a broad liberal arts and sciences education.”

**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
- Accountability and assessment as key tools to drive continuous improvement

http://ssm.cofc.edu/pv_obj_cache/pv_obj_id_7783D7ED33B75FDD03E23C1D7 StrategicPlan-S09%20GP.pdf

Our bumper sticker mission is "Integrating discovery, innovation and education and our nation."

**Comments and Attachments**
For all of our program goals, the departmental assessment committee recommends between departmental expectations, the guidance provided by faculty mentors, students taking the target courses.

- [Associate Dean Comments and Completed Rubric](#)

**Program follows specialized accreditation standards:**

**Name of accrediting organization:**
**Date of last program review for the accrediting organization:**
**Related Items**
*There are no related items.*

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2: Experimental Design and Analysis

**Program Goal or SLO**
Students design and carry out an experiment to solve an astrophysics-related problem.

**Assessment Method / Performance Expected**
Assessment of this SLO will be carried out through evaluation of capstone research reports completed by Astro BS majors as part of PHYS 420 or PHYS 499. Assessment criteria include the following elements, which have been adapted in part from rubrics developed by Miami University’s Center for the Enhancement of Learning, Teaching,
APPENDIX D: ASSESSMENT REPORT

and University Assessment.

1. Identifies the problem/question to be investigated.
2. Identifies existing, relevant knowledge and views.
3. Uses appropriate equipment or experimental/computational techniques to collect data.
4. Analyzes data in an appropriate manner.
5. Draws sound inferences and conclusions from data.
6. Reflects on own work to assure that conclusions are justified.
7. Identifies steps for future inquiry.

Each measure is evaluated on a 4 point scale corresponding to Inadequate (1), Minimally Developed (2), Proficient (3), and Mastery (4). The performance expected for success is that 80% of the students will have an average score of Proficient or better.

**Assessment Results**
Two Astro BS students completed capstone research projects within the past year. The results of their Experimental Design and Analysis assessment are:

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Student 1: 4 3 4 4 4 4 4; Average=3.9 (Proficient/Mastery)
Student 2: 4 4 1 4 4 4 4; Average=3.6; (Proficient/Mastery)

1=Identifies the problem/question to be investigated.
2=Identifies existing, relevant knowledge and views.
3=Uses appropriate equipment or experimental/computational techniques to collect data.
4=Analyzes data in an appropriate manner.
5=Draws sound inferences and conclusions from data.
6=Reflects on own work to assure that conclusions are justified.
7=Identifies steps for future inquiry.

Both evaluated students achieved average scores above Proficient. The single low score of 1 (Inadequate) achieved by Student 2 for sub-category 3 (data collection) was due solely to the fact that the student’s capstone project focused on theoretical modeling of existing data rather than collecting data. The low score was not due to any inherent deficiency in the student’s methods or reasonings.

**Use of Results**
Not enough Astro BS students graduated to gather robust statistics. But based on the limited results, Astro BS students are exceeding expectations for Experimental Design and Analysis. Student 2 was downgraded for not collecting her/his own data, but rather carrying out theoretical modeling of existing
data. The department has previously judged theoretical modeling to be a worthy topic for a capstone research project. It is therefore recommended that future assessment rubrics either be modified to accommodate theoretical research projects, or else alternative courses be used to evaluate Experimental Design and Analysis among Astro BS majors.

Budget Changes
Comments and Attachments
Related Items

1: Enhance the undergraduate academic core.

3: Understanding of Motion Concepts

Program Goal or SLO
Students apply classical and relativistic motion principles correctly in astrophysics problems.

Assessment Method / Performance Expected
This outcome will be assessed in the Planetary, Stellar, and Galactic/Extragalactic Astrophysics courses.

Relevant questions on exams in each course will be collected and evaluated for understanding and correctness.

Students are expected to achieve an average score of 75% on the assessment questions.

Assessment Results
No relevant questions were provided from the Galactic/Extragalactic course taught in Spring 2014, but one relevant question from the Stellar Astrophysics course taught in Fall 2013 was provided. We assess that question and the 10 student responses provided.

Question: Derive the value of the constant 4.74 in the tangential velocity definition, \( v_t = 4.74 \mu d \), where \( v_t \) is given in units of (km/s) and the proper motion \( \mu \) and the distance \( d \) are given in units of (arcseconds/year) and (pc), respectively.

6 of the students received 0 credit for their answers on the original
assignment. Of those 6, 5 made some attempt to answer the problem, but clearly did not recognize what the problem was asking and made no meaningful progress toward answering it.

Of the 4 students who received some credit for their answer, 1 merely recognized that the problem had something to do with units, but was unable to progress beyond that recognition; 1 started to do the necessary unit conversions, but stopped inexplicably; another student completed part of the conversion, but did not seem to know how to finish; and only the final student received full credit.

Clearly this falls well short of the 75% standard that was set for this SLO.

**Use of Results**
At its core, the question used for assessment this year really comes down to students understanding that units must match on both sides of an equation. This is such a fundamental principle of solving equations in physics, that it is distressing that upper level Astrophysics BS students do not know about this. The concept of unit conversion and unit balance is taught beginning in 1st semester Physics (PHYS 111). Given the very poor performance of students on the assigned question, it seems we are doing a very poor job of emphasizing this in subsequent coursework. Recommend:

1. PHYS 111/112 teachers put greater emphasis on unit balance and unit conversion.

2. ASTR 231 (Introduction to Astrophysics) instructor should also review basic unit balance and unit conversion.

**Budget Changes**
There are no budget changes.

**Comments and Attachments**
The particular problem used to assess this SLO this year was not really a motion-concept problem, per se, but more of a unit conversion problem. We would like to see more true motion concepts tested in the upper-level Astrophysics courses in the future.

**Related Items**

1: Enhance the undergraduate academic core.
Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)

Related Items
There are no related items.
Biomedical Physics - Minor

Biomedical Physics Minor
Program Name: Minor in biomedical physics
Program Type: Other
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Associate Professor (Oprisan, Sorinel), Department Chair (Kuthirummal, Narayanan)
Administrative Unit Director receiving assessment updates: Associate Dean (Deavor, James)
Date of next program review:

Program/Department Mission Statement
1. Department of Physics and Astronomy - Mission Statement
“Our goal, within the liberal arts culture, is to offer the highest quality undergraduate physics/astronomy-affiliated education to our students. We offer a vigorous undergraduate curriculum across many disciplinary and interdisciplinary areas. Students acquire excellent mathematical, computational, and analytical skills during the coursework so that they become professionally competent to solve complex problems in virtually any field. We are strongly driven by the core values of excellence, academic freedom, integrity, collaboration, diversity, mutual respect, fairness, justice, and service.” [1]

“The Department has assembled a list of educational objectives for its majors. These objectives are gathered under the following categories: communication, experimental physics, theoretical physics and history and biography. Graduates should be able to communicate effectively through written and oral presentation. All graduates should be able to assemble appropriate equipment and to perform measurements that enable them to analyze physical phenomena. Students should possess the skills and techniques (mathematical, statistical, graphical, computer and writing) necessary to successfully interpret and analyze their experimental data. Critical examination of experimental results should lead to improved experimental design. Theoretical course work should enable majors to solve problems in diverse fields such as astrophysics, mechanics, electricity and magnetism, optics, quantum mechanics, thermodynamics, and statistical mechanics depending on the specific course work completed. This analytical ability is grounded on an extensive set of mathematical tools acquired in appropriate mathematics courses (specified by course prerequisites). Graduates should be aware of the ideas and linkages implicit in the history and biography of physics.”[2]

2. Biomedical Physics Minor
APPENDIX D: ASSESSMENT REPORT

2.1 Program’s Evolution:
The Biomedical Physics Minor (BMPH) was approved by the Faculty Senate of the college of Charleston on April 6, 2010 and included for the first time in 2010-2011 Undergraduate Catalog.

- The initial phase of curriculum development culminated in the Fall of 2007 with a plan for a biophysics concentration that required the development of four new biophysics-oriented courses: PHYS 3xx - Intermediate biophysics (Dr. Jones); PHYS 3xx Computational Neuroscience (Dr. Oprisan); PHYS 4xx Biomedical Optics (Dr. Jones); PHYS 4xx Molecular Biophysics. The biophysics concentration was envisioned as a bridge between Physics, Biology (minimum prerequisites Biology 111, 112) and Chemistry (minimum prerequisites in Chemistry 111/112).
- By the Fall of 2009, the Biophysics Committee (Drs. Jones, Oprisan and Hakkila) decided that developing and staffing four new biophysics course is a too ambitions plan, given that the department only has two biophysicists, and scaled back to a Biophysics Minor proposal based on the existing courses. Therefore, the Biophysics Minor proposal was developed around two core courses: PHYS 203 Physics & Medicine (Dr. Jones) and PHYS 296/BIOL 396 Biophysical Modeling of Excitable Cells (Dr. Oprisan). Eventually, the name of the new minor was changed during the Spring of 2010 to Biomedical Physics and approved by the Faculty Senate on April 6, 2010 [3].

2.2 Program’s Governance
The two biophysicists in the Department of Physics and Astronomy, Drs. Linda Jones and Sorinel A. Oprisan, serve as co-coordinator of the Biomedical Physics Minor. Although the minor does not have any formal bylaws, the two co-coordinators consult each other regarding the development of new courses for the minor, changing the number and the structure of the core courses and electives, approving course substitution for students, etc.

2.3 Program Goals
The Biomedical Physics Minor strives to serve a diverse group of students beyond physics and astronomy majors, including students who are preparing for a career in the health sciences. The goals of the program are aligned with the strategic plan of the department, School of Sciences and Mathematics (SSM), and the College for expanding its offering in selected areas in order to build upon the expertise of our faculty, including in the area of biophysics and biomedical physics. Furthermore, this program supports the departmental and SSM aims of encouraging interdisciplinary experiences in order to broaden the training and career opportunities of our students.

The biomedical physics minor was designed for students who are
interested in applying physical principles to biological systems as preparation for a career in biological or medical physics or for graduate study in the health sciences. The biomedical physics minor encourages non-physics majors to explore additional physics courses beyond the introductory level. Non-physics majors include Biology, Chemistry, Psychology, and other majors that typically pursue pre-health studies. The program enhances critical thinking skills, promote interdisciplinary problem solving and increase the students' confidence and ability in quantitative and computational areas.

Specific Goals

1. To provide students with an understanding of advances in both experimental and computational biomedical-related technology.
2. To enhance conceptual, quantitative and computational skills as applied to biomedical-related problems.
3. To help students communicate and collaborate with people in other disciplines.

Student Learning Objectives for the biomedical physics minor

1. Students demonstrate critical thinking skills and apply physics knowledge to solve biomedical problems.
2. Students effectively communicate in scientific discussions and presentations.
3. Students explain biological processes with physical principles and model them with computational tools.

References

Unit or School Mission
1. School of Sciences and Mathematics - Mission Statement

1.1 Vision
“Our vision is to be a community of teacher-scholars committed to creating an environment of distinctiveness and excellence that supports and nurtures students as scholars and encourages learning through inquiry, all within the framework of a broad liberal arts and sciences education.” [4]
1.2 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
- Accountability and assessment as key tools to drive continuous improvement

1.3 Goals for 2020

**Goal 1 (Role of Sciences in the College of Charleston Undergraduate Curriculum):** "To ensure that all College of Charleston undergraduates acquire an education that will equip them with the scientific, mathematical, and statistical literacy that will be critical in order for them to be leaders in their profession as well as informed citizens in a society that will continue to be increasingly dependent on science and technology." [4]

**Goal 2 (The Undergraduate Curricula, Programs, and Experiences):** "To be nationally recognized for the quality of our undergraduate programs. Our students will receive the most current knowledge of the subject matter and procedures in a chosen program of study and its supporting areas. They will have opportunities to collaborate with faculty, graduate students, and other undergraduates in significant research experiences. Programs for SSM majors will establish and emphasize depth of disciplinary knowledge as well as connections between and among disciplines. Imaginative and creative teaching techniques supplement traditional methods to achieve optimum student learning. The atmosphere maintained in the learning environment manifests a commitment to providing a global perspective and sensitivity to the impact of science and mathematics on society. Special programs attract and encourage students from under-represented populations. SSM programs are both distinctive and excellent. In some cases the distinctiveness is because programs have been built upon geographical or other special considerations that uniquely characterize the College of Charleston. Other programs are distinctive because they are traditional in content but are characterized by particularly high quality." [4]

**Goal 3 (Faculty in the School of Sciences and Mathematics):** "To have a faculty in the School of Sciences and Mathematics who are characterized by an unquestioned commitment to teaching while simultaneously maintaining a level of research and scholarship appropriate for the mission of the institution. The faculty
have as their three key professional goals to: stimulate learning, to convey understanding of and appreciation for their disciplines, and to continue their scholarly activities and guide undergraduate research. Research and scholarship by students and faculty provide the foundation for programs in the School of Sciences and Mathematics. Scholarship is expected of faculty, as faculty cannot be expected to convey passion and excitement for learning if they are not involved in the process. Teaching springs from passion that comes from mental engagement in the process of inquiry. Science and Mathematics programs emphasize research by faculty and students as the single most effective form of teaching. Independent-study, faculty-student research, and other forms of one-on-one interaction between student and professor are of primary importance to all departments in the School of Sciences and Mathematics, as these experiences provide the personal interaction between faculty and students that is essential to a liberal arts education." [4]

**Goal 4 (Graduate Programs):** "To provide more opportunities for graduate education in the sciences to not only serve the needs of the region, but also to enhance the undergraduate programs."[4]

**Goal 5 (Increase Faculty and Student Exchanges and Collaborations):** "To expand opportunities for faculty and student exchanges and collaborations with both national and international institutions." [4]

**Goal 6 (Resources, Facilities and Technology):** "To have the resources, facilities and technology necessary to support the goals of the School." [4]

**Goal 7 (Community and Alumni Engagement):** "To increase our engagement with our alumni and the community outside of the College." [4]

**Goal 8 (Organization and Leadership Responsibilities):** "To maintain a culture within the School that preserves the historical identity and mission of the College and respects the judgments and contributions of administration, faculty, staff, and students in advancing the mission of the School of Sciences and Mathematics and the College." [4]

**2. College of Charleston**

**2.1 Core Purpose:** "To pursue and share knowledge through study, inquiry and creation in order to empower the individual and enrich society." [5]

**2.2 Core Values:**
2.3 Statement of Institutional Mission
"The College of Charleston is a state supported comprehensive institution providing a high quality education in the arts and sciences, education and business. Consistent with its heritage since its founding in 1770, the College retains a strong liberal arts undergraduate curriculum. Located in the heart of historic Charleston, it strives to meet the growing educational demands primarily of the Lowcountry and the state and, secondarily, of the Southeast. A superior quality undergraduate program is central to the mission of the College. The College of Charleston seeks applicants capable of successfully completing degree requirements and pays particular attention to identifying and admitting students who excel academically. The College of Charleston serves a diverse student body from its geographical area and also attracts students from national and international communities. The College provides students a community in which to engage in original inquiry and creative expression in an atmosphere of intellectual freedom. This community, founded on the principles of the liberal arts tradition, provides students the opportunity to realize their intellectual and personal potential and to become responsible, productive members of society. In addition to offering a broad range of baccalaureate degree programs, the College currently provides an increasing number of masters degree programs which are compatible with the community and the state. As a prominent component of the state’s higher education system, the College encourages and supports research. Its faculty are important sources of knowledge and expertise for the community, state, and nation. Additionally, the College provides an extensive credit and non-credit continuing education program and cultural activities for residents of the Lowcountry of South Carolina. Approved by the Board of Trustees of the College of Charleston on July 14, 2006." [5]

References
APPENDIX D: ASSESSMENT REPORT

Comments and Attachments

- Associate Dean’s Comments

Program follows specialized accreditation standards:
Name of accrediting organization:
Date of last program review for the accrediting organization:
Related Items
There are no related items.

10: Problem Solving

Program Goal or SLO
Students demonstrate critical thinking skills and apply physics knowledge to solve quantitative biomedical/biophysics problems.

Assessment Method / Performance Expected
Since the Biomedical Physics Minor has only two core courses (PHYS 203 Physics & Medicine and PHYS 396 / BIOL 396 Biophysical Modeling of Excitable Cells) and because PHYS 203 was not offered during the academic year 2013-2014, this round of assessment was only done on the only core course offered, i.e. PHYS 396 / BIOL 396. Students in the core course PHYS 396 / BIOL 396 Biophysical Modeling of Excitable Cells will be assigned interdisciplinary problems to solve using physics principles. The assignment will be given either as part of the final exam or a homework near the end of the semester. Specific principles that were presented in the class will be involved in the solution.

The assessment will include creativity, physics knowledge and application and correctness of the solution. A score of 75% is expected.

The assessment rubric is similar to that used by Dr. Linda Jones for Physics BA/Minor.

To assess the problem skills we used homework #2. The homework consisted of 4 different numerical problems and we selected problem #2 and evaluated it for all 18 students in the Fall 2013 class. The specific problem was as follows (the entire assignment was uploaded also):
“Suppose that the resting membrane potential of a spherical cell, which is 20 microns in diameter, is V_{rest} = -70 \text{ mV}. How much current is needed to raise the potential of the cell to -55 \text{ mV}? Assume R_m = 104 \text{ Ohm cm}^2 \text{ and } C_m = 1 \text{ microF/cm}^2 \text{ and the injected current holds indefinitely.}”

We used the following assessment criteria:
Crt. 1: Identified the concepts the principles.
Crt. 2: Identified and correctly wrote the appropriate mathematical formulas.
Crt. 3: Performed all calculations correctly and explicitly.
Crt. 4: Use appropriate units throughout the entire solution.
Crt. 5: Provided a correct final answer.

We used a 3-point scale (1 point = unsatisfactory, 2 points = acceptable, 3 points = excellent).

**Assessment Results**
There were 11 students in Physics section and 7 students in Biology section of the cross-listed biophysics class. All students are required to satisfy both physics and biology before enrolling in this class. The problem #2 of Hwk #2 that we assessed has an average-to-high level of difficulty for a physics student who probably encountered similar concepts in PHYS 409 Electricity and Magnetism. However, we need to keep in mind that almost half of the students are biology majors who may not be accustomed to such calculations. This particular assignment is more towards physics side of this biophysics class. The results show that the two sections performed very close to each other (Physics 85.5 +/- 13.2, Biology 85.7 +/- 13.0).

**Crt. 1: Identified the concepts the principles:** Physics 2.9 out of 3 points +/- 0.3, Biology 3 out of 3 points. The differences are not statistically significant and most likely are due to the fact that physics students assumed that everybody knows what concepts and principles we are testing and did not offer elaborated explanations.

**Crt. 2: Identified and correctly wrote the appropriate mathematical formulas:** Physics 2.8 out of 3 points +/- 0.4, Biology 3 out of 3 points. The differences are not statistically significant and most likely are due to the fact that physics students assumed that everybody knows what concepts and principles we are testing and did not offer elaborated explanations.

**Crt. 3: Performed all calculations correctly and explicitly:** Physics 2.1 out of 3 points +/- 0.8, Biology 2.1 out of 3 points +/- 0.9. Most of the students, regardless the section Physics/Biology of this interdisciplinary biophysics class either skipped some steps of the solutions or performed some wrong calculations. The difficulty is coupled with the fact that the students must also pay attention to units and unit conversion since the input data were given in non-SI
units.

Crt. 4: Use appropriate units throughout the entire solution: Physics 2.4 out of 3 points +/- 0.7, Biology 2.3 out of 3 points +/- 0.5. The performance of both sections was similar and hints to the fact that maybe the students are not used to carry out dimensional analysis, in addition to numerical calculations.

Crt. 5: Provided a correct final answer: Physics 2.6 out of 3 points +/- 0.5, Biology 2.4 out of 3 points +/- 0.8.

Use of Results
It will be recommended to have more quantitative problems that involve both calculating the actual result and the appropriate units through dimensional analysis.

3 out of the 11 students (27%) in Physics section and 2 out of 7 students (28%) in Biology section of this biophysics class scored below the 75% goal. All students correctly identified the concepts the principles involved in solving the problem, which means that they know the fundamental concepts and have a good grasp of the biophysical principles. All students identified and wrote the appropriate mathematical formulas necessary for solving the problem, which means that they have the appropriate mathematical/theoretical understanding of the concepts and principles.

Since the major weakness is in carrying out the calculations and dimensional analysis, it would be recommended to solve more problems in class and during the review sessions of this course. It would also be helpful for this core course if the students would come from the introductory/general physics courses with more examples of calculations and dimensional analysis.

Budget Changes
There are no budget changes.

Comments and Attachments
Related Items
There are no related items.

11: Communication skills

Program Goal or SLO
Students effectively communicate in scientific discussions and presentations.

Assessment Method / Performance Expected
Since the Biomedical Physics Minor has only two core courses (PHYS
APPENDIX D: ASSESSMENT REPORT

203 Physics & Medicine and PHYS 396 / BIOL 396 Biophysical Modeling of Excitable Cells) and because PHYS 203 was not offered during the academic year 2013-2014, this round of assessment was only done on the only core course offered, i.e. PHYS 396 / BIOL 396. Students in the core course PHYS 396 / BIOL 396 Biophysical Modeling of Excitable Cells will be given biomedical/biophysics-related interdisciplinary assignments in which they present a topic to the class or participate in a formal discussion. Students will be assessed on their presentation skills including the ability to make a clear point and support it with scientific evidence and the ability to answer questions about their statements. Assignments may include impromptu questions or assigned topics.

Assessment scores are expected to be 75%.

The students were given six review papers that introduce them to different aspects of the biophysical modeling. The six topics were selected such that they address the following learning outcomes of the course:

- Demonstrate an understanding of the impact that science has on society.
- Understand the historical context that lead to major advances in experimental and mathematical modeling of excitable cells.
- Enhance scientific communication skills.
- Present, in a concise manner, the results of an individual or group project.

The six topics were:

6. Neuroscience nanotechnology: progress, opportunities and challenges, Gabriel A. Silva, NATURE REVIEWS |
The 18 students in PHYS 396/BIO 396 formed groups of three students. For each group, the task was to read the assigned review paper, summarize it, write and essay starting from the given review paper, and present the topic in front of the entire class using PowerPoint.

We used the following assessment criteria both for the written essay and the corresponding PPT presentation:
Crt. 1: Logical structure and organization of the discourse (written and/or oral).
Crt. 2: Level of technical language, correctness and completeness of definitions.
Crt. 3: Formal delivery of the product (written and/or oral presentation).
Crt. 4: Depth and breadth of presentation, supporting materials and additional references.
We used a 3-point scale (1 point = unsatisfactory, 2 points = acceptable, 3 points = excellent).

Assessment Results
The review papers assessed have an average-to-high level of difficulty due to their very specialized nature and the breadth of the biomedical/biophysics filed. The average score for class was 79.3% +/- 4.6%, which is above the 75% target. The main reason is that the students are juniors and seniors and by the time they take this biophysics class they already prepared many other literature review essays and presented in front of classmates.

Crt. 1: Logical structure and organization of the discourse (written and/or oral): 3 points out of 3. The result is expected since this was not a regular prompt-based essay where students receive just the topic and then they explore. Since they were asked to summarize review papers, the students followed the structure of the logical organization of the original paper.
Crt. 2: Level of technical language, correctness and completeness of definitions: 2 points out of 3. The result is acceptable considering that the students are exposed probably for the first time to very technical details that cross multiple disciplines (biology, physics, mathematics, computer science). Each student group has at least one biology students, who may be familiar with the biological terminology, but way outside their comfort zone when reading and presenting mathematical models implemented in novel computational models. The same is true for the physics section when
it comes to expressing correctly the biological foundation of the work they reviewed.

**Crt. 3: Formal delivery of the product (written and/or oral presentation):** 2.5 points out of 3 +/- 0.5 points. The result is good and expected given the fact that the students are juniors and seniors and they practiced essay writing and oral presentations many times up to this point. However, there are always things to improve and the class provided constructive feedback from students with different background. This is a very realistic preparation for teamwork in the workplace where the students will be in the position of explaining highly technical work and results to others outside their respective filed of expertise.

**Crt. 4: Depth and breadth of presentation, supporting materials and additional references:** 2 points out of 3. The performance is acceptable given that the students are required to make connections between concepts they learned in different fields.

**Use of Results**
It will be recommended to have more at least one more literature review essay during the semester such that the students can improve both the use of technical language (criterion 2) and gain a broader understanding of the field (criterion 4). It would also be helpful for this core course if the students would come from the other courses in their discipline with more experience in preparing an essay and giving a presentation.

**Budget Changes**
There are no budget changes.

**Comments and Attachments**
**Related Items**
*There are no related items.*

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**12: Modeling Biophysical Processes**

**Program Goal or SLO**
Students explain biological/biophysical processes with physical principles and model them mathematically and with computational tools.

**Assessment Method / Performance Expected**
Since the Biomedical Physics Minor has only two core courses (PHYS 203 Physics & Medicine and PHYS 396 / BIOL 396 Biophysical Modeling of Excitable Cells) and because PHYS 203 was not offered during the academic year 2013-2014, this round of assessment was only done on the only core course offered, i.e. PHYS 396 / BIOL 396.
Students will be assessed for their increased knowledge and appreciation of the physics involved in selected biological/biophysical processes. This goal specifically includes computational skills in addition to physics content. Students in the core PHYS 396/BIOL 396 Biophysical Modeling of Excitable Cells course will be given a computational project that requires a computational solution using a method that is presented in the course.

The assessment is tailored to the following specific learning outcomes explicitly stated in the syllabus of PHYS 396/BIOL 396 course:

- Develop a strong conceptual and quantitative understanding of the biophysics behind cellular excitability.
- Connect biophysical concepts, principals, and laws to biology and behavior by using mathematical concepts, equations, and computational tools.

A score of 75% is expected on the assignments.

The assessment rubric is similar to that used for quantitative problem solving.

To assess the computational skills we used hands-on activity #2 “Equilibrium Potential”. The computational exercise has three independent problems and we only assessed problem #1. Each of the three problems require complex computational abilities:

1. The student must successfully carry out numerical simulations (“experiments”) of cellular membrane activity using NEURON software package and measure the concentration of potassium ions outside the cell.
2. The student must fit the “experimental” data obtained with NEURON with a software package of his/her choice (Mathematica, Matlab, Excel, etc.) and extract the parameters of the theoretical fir together with some statistics.
3. The students must predict the concentration of potassium based on Nernst’s formula and compare the prediction against the “experimental” data obtained with NEURON.

The actual problem tested is as follows:

**1. K Conductance Only**

Hold the intracellular $K^{+}_{in}$ concentration at 124 mM and change the extracellular concentration from its standard value of 5 mM in steps of 10 mM.

1a) For each value of $K^{+}_{out}$ extracellular concentration, measure with the crosshair the membrane potential, which coincides with the reversal potential $E_{K}$ for $K^{+}$ ions and fill out Tale 1.
Table 1. $K_{in} = 124$ mM for all simulations

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Hint: The predicted value of $E_K$ is determined from Nernst’s formula

$$E_K = \frac{(25 \text{ mV})}{z} \ln(X_{out}/X_{in}).$$

1b) Show one example of calculations below

$$E_K = (25 \text{ mV}) \ln(_____ \text{ mM}/124 \text{ mM}) =$$

1c) Plot the data from Table 1 on a semi-logarithmic scale, i.e., $E_K$ versus $\ln(K_{out})$, and attach the graph. Show a linear fit of the data and include its equation on your graph (you may want to use Excel or similar software for this part).

What slope do you predict for a semi-log plot of $E_K$ versus $\ln(K_{out})$? Why?

What value do you predict for the intercept of the plot? Why?

One team performed the experiment above, but used a different value of $K_{in}$. In their experiment, the intercept of a semi-log plot of $E_K(\text{mV})$ versus $\ln(K_{out}(\text{mM}))$ was -135. What was the value of $K_{in}$ in their experiment?

We used the following assessment criteria:

Crt. 1: Conducted numerical simulations of the excitable cell membrane in NEURON environment and acquired the experimental values for potassium concentration.

Crt. 2: Plot and fit the experimental data.

Crt. 3: Computed the theoretical value for potassium concentration using Nernst’s formula and compared against the experiments.

We used a 3-point scale (1 point = unsatisfactory, 2 points = acceptable, 3 points = excellent)

**Assessment Results**

The hands-on activity #2 problem # 1 that we assessed has an average-to-high level of difficulty and requires students to master multiple software platforms. They need to master the simulation of cell membrane to extract the ionic concentrations. The also need to master data fitting and theoretical calculations of Nernst’s potentials. The results show that the two sections performed very close to each other (Physics 82.8 +/- 7.6, Biology 84.1 +/- 8.7).

Crt. 1: Conducted numerical simulations of the excitable cell
membrane in NEURON environment and acquired the experimental values for potassium concentration: Physics 2.9 out of 3 points +/- 0.3, Biology 2.9 out of 3 points +/- 0.4. The results suggest that the user friendly interface of the “Neuron in Action” software package allowed students a rapid and thorough understanding of the computational manipulations that can be performed on cell membranes. The students were able to accurately measure the concentration of ionic species using “Neuron in Action”.

**Crt. 2: Plot and fit the experimental data:** Physics 2.5 out of 3 points +/- 0.5, Biology 2.6 out of 3 points +/- 0.6. The results are good and there are no statistically significant differences between Biology and Physics sections. The only difficulty encountered by the majority of students was to plot on semi-log or log-log axis.

**Crt. 3: Computed the theoretical value for potassium concentration using Nernst’s formula and compared against the experiments:** Physics 2.1 out of 3 points +/- 0.3, Biology 2.1 out of 3 points +/- 0.4. Most of the students, regardless the section Physics/Biology of this interdisciplinary biophysics class correctly identified the formula that would predict the concentration of potassium. Some difficulties were however, they did not either skipped some steps of the solutions or performed some wrong calculations. The difficulty is coupled with the fact that the students must also pay attention to units and unit conversion since the input data were given in non-SI units.

**Use of Results**

Without any doubt, PHYS 396/BIOL 396 is a stimulating and challenging core course for the Biomedical Minor students who must have prerequisites both in Physics and Biology to enroll. The class is stimulating because it brings together physicists and biologists and ask them to work together on pretty much every assignments (except tests) the same way they will soon work as graduate students or in the workplace. The fact that the teams are interdisciplinary with at least one biologist and one physicist fostered collaboration and enhanced learning. It is surprising that for the first evaluation criteria (“Conducted numerical simulations of the excitable cell membrane...”) the performance is at 2.9 out of 3 points both for Physics and Biology sections. This shows that the PHYS 396/BIOL 396 does not need computer science (CS) prerequisites and we right not to require CS since the focus is not on computer programming, but rather using user-friendly graphic interfaces of very well designed and free software packages, such as “Neurons in Action”, to simulate biological phenomena. Therefore, we recommend keeping the current structure of the prerequisites for PHYS 396/BIOL 396 and continue focusing on the understanding of biological processing that are modeled rather than on how the models were implemented in a computer code.

The second evaluation criterion (“Plot and fit the experimental data”) showed that both Physics and Biology sections are well versed in
plotting and fitting experimental data. The only difficulty we noticed is with the use of nonstandard axis (semi-log, log-log) when they have some difficulties interpreting the meaning of the fitting parameters and their units.

The comparison between the experimental and theoretical results, which was the subject of the third assessment criterion, only reached the acceptable level of performance and there is room for improvement. There is no difference between Physics and Biology sections. Other courses could significantly contribute to a better understanding of model fitting of experimental data. For example, for physics students the PHYS 370 Experimental Physics and other upper level physics courses could help. Regardless of whatever other courses could do and without increasing the numbers of prerequisites for this class, we recommend focusing a lecture or two on some commonly used statistical tests to validate theoretical models based on experimental data.

**Budget Changes**
There are no budget changes.

**Comments and Attachments**
**Related Items**
*There are no related items.*

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**Program Improvement Summary FY 2014**

**Summary of assessment results with focus on program improvement (to be shared publicly)**

1. **Biomedical Physics Minor**

The Biomedical Physics Minor strives to serve a diverse group of students beyond physics and astronomy majors, including students who are preparing for a career in the health sciences. The goals of the program are aligned with the strategic plan of the department, School of Sciences and Mathematics (SSM), and the College for expanding its offering in selected areas in order to build upon the expertise of our faculty, including in the area of biophysics and biomedical physics. Furthermore, this program supports the departmental and SSM aims of encouraging interdisciplinary experiences in order to broaden the training and career opportunities of our students.

The biomedical physics minor was designed for students who are interested in applying physical principles to biological systems as preparation for a career in biological or medical physics or for
graduate study in the health sciences. The biomedical physics minor encourages non-physics majors to explore additional physics courses beyond the introductory level. Non-physics majors include Biology, Chemistry, Psychology, and other majors that typically pursue pre-health studies. The program enhances critical thinking skills, promote interdisciplinary problem solving and increase the students' confidence and ability in quantitative and computational areas.

2. Student Learning Objectives

The assessment of the Biomedical Physics Minor was performed according to the following Student Learning Objectives (SLO):

1. Students demonstrate critical thinking skills and apply physics knowledge to solve biomedical problems.
2. Students effectively communicate in scientific discussions and presentations.
3. Students explain biological processes with physical principles and model them with computational tools.

Since the Biomedical Physics Minor has only two core courses (PHYS 203 Physics & Medicine and PHYS 396 / BIOL 396 Biophysical Modeling of Excitable Cells) and because PHYS 203 was not offered during the academic year 2013-2014, this round of assessment was only done using the data from the only core course offered, i.e. PHYS 396 / BIOL 396. There were 11 students in Physics section and 7 students in Biology section of the cross-listed PHYS 396 / BIOL 396 class. All students are required to satisfy both physics and biology prerequisites.

For each of the three SLOs listed above, we expected a score of 75% or better.

3. Assessment Results

**SLO1:** Students demonstrate critical thinking skills and apply physics knowledge to solve biomedical problems. The assignment has an average-to-high level of difficulty. The results show that the two sections performed very close to each other (Physics 85.5 +/- 13.2, Biology 85.7 +/- 13.0) and well above the 75% threshold.

**SLO2:** Students effectively communicate in scientific discussions and presentations. The assignment has an average-to-high level of difficulty due to the very specialized nature and the breadth of the biomedical/biophysics filed. The average score for class was 79.3% +/- 4.6%, which is above the 75% target.

**SLO3:** Students explain biological processes with physical principles and model them with computational tools. The computational
assignment had an average-to-high level of difficulty given that computer programming is not a prerequisite for this class or for the majors. The results show that the two sections performed very close to each other (Physics 82.8 +/- 7.6, Biology 84.1 +/- 8.7) and well above the 75% threshold.

4. Recommendations

**SLO1:** All students correctly identified the concepts the principles involved in solving the problem. Furthermore, all students identified and wrote the appropriate mathematical formulas necessary for solving the problem. Since the major weakness is in carrying out the calculations and dimensional analysis, it would be useful to solve more problems in class and during the review sessions of this course. It would also be helpful for this core course if the students would come from the introductory/general physics courses with more examples of calculations and dimensional analysis.

**SLO2:** It will be recommended to have more at least one more literature review essay during the semester such that the students can improve both the use of technical language (criterion 2) and gain a broader understanding of the field (criterion 4). It would also be helpful for this core course if the students would come from the other courses in their discipline with more experience in preparing an essay and giving a presentation.

**SLO3:** Most difficulties were encountered while attempting to design a mathematical model based on experimental data obtained in the lab. However, this is also the most difficult task that every research faces every single day in the lab and we need to constantly improve the methods and techniques. There is no difference between Physics and Biology sections. Other courses could significantly contribute to a better understanding of model fitting of experimental data. For example, for physics students the PHYS 370 Experimental Physics and other upper level physics courses could help.

**Related Items**
*There are no related items.*
Meteorology - Minor

Meteorology Minor
Program Name: Meteorology Minor
Program Type: Other
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Associate Professor (Fragile, Chris), Dep Narayanan
Administrative Unit Director receiving assessment updates: Associate Dep
Date of next program review:

Program/Department Mission Statement
The primary emphasis of the Department of Physics and Astronomy at the College teaching within a liberal arts environment. Our course offerings, research programs centered on the needs of students. We strive to serve the greater Charleston community, including outreach activities to pre-college teachers and students and to the general public. We have a strong emphasis on undergraduate research as a major component of a science education, a combination of experimental and theoretical physics in various specialized subfields of traditional physics.

The meteorology minor is designed for students with an interest in weather research to enhance their major field of study.

Goals

- Students will have a deeper knowledge of all branches of meteorology.
- Students will understand how meteorology interrelates with other fields.
- Students will have good oral and written scientific communication skills.

Learning Outcomes

- Students understand key principles central to meteorology.
- Students understand the impacts meteorology has on society and nature.
- Students demonstrate the interdisciplinary nature of meteorology.

Unit or School Mission
“Our vision is to be a community of teacher-scholars committed to creating an highest excellence that supports and nurtures students as scholars and encourages learning within framework of a broad liberal arts and sciences education.”

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
Accountability and assessment as key tools to drive continuous improvement

Our bumper sticker mission is "Integrating discovery, innovation and education and our nation."

Comments and Attachments

SSM Associate Dean's Comments

Program follows specialized accreditation standards:  
Name of accrediting organization:  
Date of last program review for the accrediting organization:

Related Items
There are no related items.

13: Principles of Meteorology

Program Goal or SLO
Students understand key principles central to meteorology.

Assessment Method / Performance Expected
Students will answer a set of 50 questions on various topics covering the information presented in the courses within the minor. The test will be given prior to graduation.

The performance expected is correct answers for 70% of the questions.

Assessment Results
There were no students completing the meteorology minor program this year. Therefore, no assessment of this SLO was required.

Use of Results
N/A.

Budget Changes
There are no budget changes.

Comments and Attachments
At least one meteorology minor is scheduled to complete the program
next year. An assessment test needs to be written for this student.

**Related Items**
*There are no related items.*

## 14: Impact of Meteorology on society and environment

**Program Goal or SLO**
Students understand the impacts meteorology has on society and nature.

**Assessment Method / Performance Expected**
A written assignment will be given 300-level courses involving the impact of meteorology on society and the environment. The assignments will be collected for assessment in the Fall and Spring.

Scientific principles and critical thinking skills will be evaluated. An overall score of 3 is expected.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Does not meet expectations 1</th>
<th>Approaches expectations 2</th>
<th>Meets expectations 3</th>
<th>Exceeds expectations 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discipline-based knowledge or evidence used</td>
<td>(Not appropriate to this discipline, or no evidence of knowledge of discipline.)</td>
<td>(Some appropriate knowledge of the discipline used)</td>
<td>(Adequate use of appropriate knowledge from this discipline used.)</td>
<td>(Student shows complete, accurate knowledge of this discipline and used it appropriately.)</td>
</tr>
</tbody>
</table>

**Assessment Results**
Only one assignment was given in a Meteorology class this year that met the criteria of this SLO. It happened to be in a PHYS 298 - Special Topics class in Synoptic Meteorology, but since the class was taught at a 300-level, this should be adequate. Only 1 student in the class was a Meteorology minor, so only that student's work was assessed.

The assignment was to compose a synoptic analysis of three (3) selected weather systems in the student's region of study. Copies of the
assignment and the student's report are attached.

The Introduction of the student's report does a good job summarizing the impact, both societal and environmental, of each of 3 major storms. This included tallying human casualties, economic impact, disruption of vital services, and damage to infrastructure and homes.

Score: 3

**Use of Results**
It is not really realistic to make an assessment of a whole program based on the performance of a single student. If we must draw a conclusion from this single datum, then it would be that the Meteorology Minor program has done a good job of training its students to recognize the impacts of meteorological events on society and the environment. However, it would be useful to collect more data to confirm this.

**Budget Changes**
There are no budget changes.

**Comments and Attachments**

- ![Student_report](Student_report)
- ![Synoptic_written_assignment](Synoptic_written_assignment)

**Related Items**
*There are no related items.*

**15: Interdisciplinary nature of meteorology**

**Program Goal or SLO**
Students demonstrate the interdisciplinary nature of meteorology.

**Assessment Method / Performance Expected**
Written assignments or oral presentations will be assigned in 300-level courses in the meteorology minor. Students will be assessed on the connections they are able to identify between meteorology and other fields.

The expected overall score on this assignment is expected to be 75%.

**Assessment Results**
Only one assignment was given in a Meteorology class this year that
met the criteria of this SLO. It happened to be in a PHYS 298 - Special Topics class in Synoptic Meteorology, but since the class was taught at the 300-level, this should be adequate. Only 1 student in the class was a Meteorology minor, so only that student's work was assessed.

Students were required to make a 15 minute oral presentation in lieu of a final examination. The presentation was supposed to focus on synoptic analysis of one major storm system. Copies of the Powerpoint slides used by the student and an audio recording of his presentation are attached.

Having reviewed the student's presentation, it does not appear appropriate to this SLO. The presentation does not include any material from outside the field of meteorology, nor does the student make any connections with other fields.

**Use of Results**

It will be recommended that the Meteorology Curriculum committee consider setting standards for which courses should be explicitly interdisciplinary in nature, and include assignments that require the students to make connections with other disciplines. Alternatively, the committee may decide that there is a more appropriate SLO that should be substituted for this one.

**Budget Changes**

There are no budget changes.

**Comments and Attachments**

- ![Audio file](Audio file)
- ![Powerpoint presentation](Powerpoint presentation)

**Related Items**

*There are no related items.*

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**Program Improvement Summary FY 2014**

Summary of assessment results with focus on program improvement (to be shared publicly)

**Related Items**

*There are no related items.*
Physics - BA/Minor

Physics - BA

Program Name: Physics  
Program Type: Undergraduate Degree  
Start: 7/1/2013  
End: 6/30/2014

Program Assessment Coordinator: Department Chair (Kuthirummal, Naraya)  
Administrative Unit Director receiving assessment updates: Dean (Auerb (Deavor, James)

Date of next program review:

Program/Department Mission Statement

The primary emphasis of the Department of Physics and Astronomy at the College is teaching within a liberal arts environment. Our course offerings, research programs, and programs are centered on the needs of students. We strive to serve the greater Charleston community, including outreach activities to pre-college teachers and students and to the general public. The program has a strong emphasis on undergraduate research as a major component of a science education, providing a combination of experimental and theoretical physics in various specialized subfields beyond the traditional physics.

The Physics Bachelor of Arts degree is designed for students who plan to pursue careers in the sciences, business or other non-technical fields. The emphasis is to develop life-long learners with excellent critical thinking skills who can apply general physics principles to real life problems.

Goals for graduates of this program include

1. Students will have command of basic physics knowledge for careers such as education, health care and business.
2. Students will be life-long learners with excellent critical thinking skills. They will be able to apply physics principles to real-life issues.

Student Learning Outcomes include

1. Students are able to answer general physics questions on the level of a teacher.
2. Students demonstrate the ability to solve numerical problems.
3. Students effectively communicate in scientific discussions and presentations.

Unit or School Mission

Vision

“Our vision is to be a community of teacher-scholars committed to creating an environment of excellence that supports and nurtures students as scholars and encourages learning within the framework of a broad liberal arts and sciences education.”

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
- Accountability and assessment as key tools to drive continuous improvement

http://ssm.cofc.edu/pv_obj_cache/pv_obj_id_7783D7ED33B75FDD03E23C1D7StrategicPlan-S09%20GP.pdf

Our bumper sticker mission is "Integrating discovery, innovation and education, and our nation."

Comments and Attachments
For all of our program goals, the departmental assessment committee recommends between departmental expectations, the guidance provided by faculty mentors, students taking the target courses.

- [2014Curriculum_Map](#)
- [Associate Dean Comments and Completed Rubric](#)

Program follows specialized accreditation standards:
- [Name of accrediting organization](#)
- [Date of last program review for the accrediting organization](#)

Related Items
- There are no related items.

1: Numerical Problem Solving

Program Goal or SLO
- Students solve quantitative (numerical) problems using appropriate physics/astronomy principles.

Assessment Method / Performance Expected
- Evidence will be collected from numerical problem-solving assignments in courses that are included on the list of electives within the Physics BA, Physics minor, Astronomy BA, and Astronomy minor programs.

The solutions will be evaluated on the basis of application of appropriate equations, clear statement of the problem and
75% of the solutions are expected to be acceptable or above.

<table>
<thead>
<tr>
<th>Student #</th>
<th>unsatisfactory</th>
<th>acceptable</th>
<th>excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear approach</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate method selected to solve the problem</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Physics principles are recognized and used appropriately</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Equations, formulas are appropriate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Algebra is correct</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculus is correct</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units are applied</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Answer is correct, reasonable</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Assessment Results**

We were rather disappointed to learn that no numerical problem-solving assignments were given in any of the Astronomy BA elective courses this year, including courses such as Stellar Astrophysics and Galactic/Extragalactic Astronomy. This means we can not assess this SLO for the Astronomy BA or Astronomy minor.

The Physics BA/Minor assessment was based on final exam numerical questions from PHYS 230 Modern Physics. Four questions were assessed with the following topics:
1. relativistic motion and energy; de Broglie wavelength
2. relativistic conservation of energy and conservation of momentum
3. Quantum mechanics wave function; probability, normalization, expectation value
4. Quantum mechanics barrier; reflection coefficient

<table>
<thead>
<tr>
<th></th>
<th>Student 1 (2.0)</th>
<th>Student 2 (2.0)</th>
<th>Student 3 (2.1)</th>
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</thead>
<tbody>
<tr>
<td>Clear approach. Appropriate method selected to solve the problem</td>
<td>1.5 1 3 3 Avg = 2.1</td>
<td>1.7 1.5 3 1 Avg = 1.8</td>
<td>1.7 1.5 3 1 Avg = 1.8</td>
</tr>
<tr>
<td>Overall avg = 1.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physics principles are recognized and used appropriately</td>
<td>1.5 1 3 3 Avg = 2.1</td>
<td>1.3 1.5 3 1 Avg = 1.7</td>
<td>1.7 1.5 2 1 Avg = 1.6</td>
</tr>
<tr>
<td>Overall avg = 1.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equations, formulas are appropriate</td>
<td>1.5 1 3 1 Avg = 1.6</td>
<td>2 3 1 Avg = 2</td>
<td>1.7 1.5 3 1 Avg = 1.8</td>
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<tr>
<td>Overall avg = 1.8</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Algebra is correct</td>
<td>1.5 2 3 2 Avg = 2.1</td>
<td>1.5 2 3 1 Avg = 1.7</td>
<td>3 1.5 3 Avg = 2.5</td>
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<tr>
<td>Calculus is correct</td>
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<td>3 2 Avg = 2.5</td>
<td>3 Avg = 3</td>
</tr>
<tr>
<td>Overall avg = 2.7</td>
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</tr>
<tr>
<td>Units are applied</td>
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<td>2 2 3 Avg = 2.3</td>
<td>3 1.5 Avg = 2.3</td>
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<tr>
<td>Overall avg = 2.2</td>
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</tr>
<tr>
<td>Answer is correct, reasonable</td>
<td>2 1 3 1 Avg = 1.8</td>
<td>2 1.5 3 1 Avg = 1.9</td>
<td>3 1.5 2 1 Avg = 1.9</td>
</tr>
<tr>
<td>Overall avg =</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Average Numerical Problem Solving score = 2.0
Problem 1 (relativistic motion, energy) 1.9
Problem 2 (relativistic conservation of energy and momentum) 1.5
Problem 3 (wave function, probability, expectation value) 2.4
Problem 4 (barrier, reflection coefficient) 1.4
1 – unsatisfactory   2 – acceptable   3 – excellent

Use of Results
It will be recommended that the Astronomy Curriculum committee consider setting standards for which courses should require at least one numerical problem-solving assignment. Alternatively, the department may consider offering a numerical methods course to specifically train our students in this topic.

Physics BA/Minor
All three students in PHYS230 in the BA/minor category scored overall 2.0 to 2.1 which meets the objective for this assessment. However, the scores for three of the four problems averaged less than 2. All of the students did well on the wave function question which represents a good basic understanding of introductory quantum mechanics. Relativistic principles continue to be a problem for the students, as seen in the assessment last year as well.

It will be recommended that upper level courses involving relativity should review the basic principles. It will also be recommended that the PHYS 230 instructors review their own teaching methods to see how best to promote understanding of the concepts.

Budget Changes
There are no budget changes.

Comments and Attachments
Related Items
There are no related items.

6: Physics Knowledge

Program Goal or SLO
Students answer questions on the basic principles of force, motion and electricity and magnetism.
Assessment Method / Performance Expected
Students will answer questions on the basic principles of force, motion and electricity and magnetism.
Graduating Physics BA and Physics Minor students will take two nationally recognized tests: the Force Concept Inventory (FCI) and the Basic Electricity and Magnetism Assessment (BEMA).
The principles tested in these instruments are first introduced in the introductory physics sequence and reinforced in subsequent courses. Successful graduating students should be able to answer 80% of the questions correctly.

Assessment Results
Spring 2014 was the first cycle for this student learning outcome. We invited physics BA and Minor students to take the test during finals week. Only two students agreed to take the test out of 15 who were invited. In spite of the low number, we will analyze these results as a starting point.

Force Concept Inventory

<table>
<thead>
<tr>
<th>question</th>
<th>Student 1</th>
<th>Student 2</th>
<th>topic</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>gravity</td>
</tr>
<tr>
<td>2</td>
<td>x</td>
<td>x</td>
<td>gravity</td>
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<tr>
<td>3</td>
<td>x</td>
<td></td>
<td>gravity</td>
</tr>
<tr>
<td>4</td>
<td>x</td>
<td>x</td>
<td>collision, Newton's third law</td>
</tr>
<tr>
<td>5</td>
<td>x</td>
<td>x</td>
<td>circular motion</td>
</tr>
<tr>
<td>6</td>
<td></td>
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<tr>
<td>7</td>
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<tr>
<td>8</td>
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<tr>
<td>9</td>
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<td>2-d motion</td>
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<td>15</td>
<td>x</td>
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<tr>
<td>16</td>
<td></td>
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</tr>
<tr>
<td>17</td>
<td>x</td>
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<td>forces</td>
</tr>
<tr>
<td>18</td>
<td>x</td>
<td></td>
<td>forces</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td></td>
<td>motion</td>
</tr>
</tbody>
</table>
A large truck collides head-on with a small compact car. Both students said that the truck exerts a greater amount of force on the car than the car exerts on the truck. Although it is counterintuitive, students learn in introductory physics that two objects interact with equal and opposite forces. This is Newton’s Third Law.

1. A puck traveling at constant speed to the right receives a kick perpendicular to its motion. Both students said that the final speed would be smaller than either the original speed or the speed in the direction of the kick. This is the most basic vector addition of velocities involving two-dimensional motion.

2. A large truck breaks down on the road and receives a push back into town by a small compact car. Both students chose the answer: “the amount of force with which the car pushes on the truck is greater than that with which the truck pushes on the car”. Again, the students are not using Newton’s third law correctly.

3. A rocket drifts sideways in outer space from point “a” to point “b”. Starting at point “b”, the rocket’s engine is turned on and produces a constant thrust (force on the rocket) at right angles to the line “ab”. The constant thrust is maintained until the rocket reaches a point “c” in space. Both students indicated that the rocket would travel in a straight line path between
points “a” abd “b” in the time during which it is receiving a constant force perpendicular to its motion. This again is basic two-dimensional motion.

It is reasonable to infer from the small data set that students would benefit from more enforcement of the laws of motion and basic forces and vectors throughout the program.

**BEMA test of basic electricity and magnetism**

<table>
<thead>
<tr>
<th>question</th>
<th>Student 1</th>
<th>Student 2</th>
<th>topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>Coulombs law, Newton's laws</td>
</tr>
<tr>
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<td>x</td>
<td>x</td>
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<tr>
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Faraday's law

= incorrect

25 questions

6 correct

4 correct

note, questions 8, 9, 17, 18, 28, 29 were omitted.

The students who were tested remembered significantly more of the force and motion material compared to electricity and magnetism. Both students were weak on the interactions between electric and magnetic fields with charged particles.

Use of Results

The FCI and BEMA were given as a baseline assessment because it involves introductory principles that we expect the students to learn. We were not sure if the tests were too easy and it turns out that they are definitely not too easy. These are conceptual questions. Chances are that the students would have more success with related numerical problems. The results show that we must repeat these basic principles throughout the major rather than assuming that the students already know the material from earlier classes.

1. emphasize Newton's laws of motion as applicable in all courses.
2. require students to refer to the laws of motion in assigned numerical problems.
3. stress Faraday's law, the Lorentz force law and other basic principles when possible in the elective courses.

Budget Changes

there are no budget changes.

Comments and Attachments

Next year, we will give the assessment test in PHYS 419 both in Fall 2014 and Spring 2015 because PHYS 419 is a required course for the BA. For the Minor students, we will make appointments with each graduating student to take the test sometime in the semester that they expect to graduate.

As a benchmark, beginning in Fall 2014 we will also give the test at the beginning of the PHYS 230 course that is required for BA students.

Related Items
15: Science literacy and written communication

Program Goal or SLO
Students communicate effectively in written works involving scientific principles.

Assessment Method / Performance Expected
BA students are required to write a paper in their senior research course (PHYS paper will be the basis for assessment of their written communication skills.

Physics minor students do not take PHYS420 so their writing skills must be assessed through written assignments in the elective courses.

A rubric is attached from the Skidmore College "Writing in the Majors" initiative. The rubric has the following points are included:
1. Demonstrates understanding of scientific writing
2. Content, comprehension and development of ideas
3. Structure and organization
4. Documenting and citing
5. Mechanics

with the categories of more than acceptable, satisfactory, unsatisfactory and unacceptable. The performance expected for success is that 80% of the students should have scores of acceptable or above.

NOTE: Please see the attached document to view all of the details in each section of the rubric.

Assessment Results
Two Physics BA students graduated in May 2014. The results of the writing assessment are:

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<tr>
<th>Student</th>
<th>1 - Demonstrates understanding of scientific writing</th>
<th>2 - Content, comprehension and development of ideas</th>
<th>3 - Structure and organization</th>
<th>4 - Documenting and citing</th>
<th>5 - Mechanics</th>
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</table>

comments
APPENDIX D: ASSESSMENT REPORT

(a) Both students neglected to synthesize results with literature in the discussion.
(b) Student 1 did not include an abstract.
(c) Student 1 wrote in a non-technical style. Since his intended audience could be lighting professionals, the tone is probably excusable.

Use of Results
It is recommended that the department develop a checklist for the PHY product that lists the writing standards and reminds the student to include an abstract.

It would be useful to provide a guide to the students (perhaps in the departmental handbook) that compares and contrasts various types of scientific reports.

The expectation of synthesizing results with literature has not been presented to the students. This was included in the Skidmore College "Writing in the Majors" statement, and we believe it is a good goal. We will discuss this with faculty to determine whether students should be expected to do this.

Budget Changes

Comments and Attachments

- Rubric

Related Items
There are no related items.

Program Improvement Summary FY 2014

Summary of assessment results with focus on program improvement (to be shared publicly)
Although the sample size was small with only two BA students graduating, we have been able to make some useful conclusions.

1. Physics BA and Minor students solve numerical physics problems. As we saw last year, students at the sophomore level are weak on relativistic principles. Faculty who teach PHYS230 should review various approaches to this topic.

2. Students answer questions on the basic principles of force, motion and electricity and magnetism. Our students need more reinforcement of the basic principles throughout their courses. Beginning in the Fall, we will give a pre-test as well as a post-test in PHYS230 and will continue to give this test to graduating BA students to see whether the problem is that they forget the basic material after being out of PHYS 111/112. It is important to
maintain the integrity of this test.

3. Students communicate effectively in written works involving scientific principles. Graduating students are generally satisfactory writers and we will work to increase the standard to excellence. Last year we found that students needed more practice in finding scientific references. This year we had a higher standard and concluded that students should synthesize the results of their work with literature.

Related Items
There are no related items.
Physics - BS

Program Name: Physics
Program Type: Undergraduate Degree
Start: 7/1/2013
End: 6/30/2014
Program Assessment Coordinator: Associate Professor (Teklu, Alem), Department of Physics and Astronomy
Administrative Unit Director receiving assessment updates: Dean (Auerbach, David), Department of Physics and Astronomy

Date of next program review:

Program/Department Mission Statement
The primary emphasis of the Department of Physics and Astronomy at the College of Charleston is teaching within a liberal arts environment. Our course offerings, research programs, and outreach activities are centered on the needs of students. We strive to serve the greater Charleston community, including outreach activities to pre-college teachers and students and to the general public. We place a strong emphasis on undergraduate research as a major component of a science education, combining experimental and theoretical physics in various specialized subfields of traditional physics.

The Physics BS degree is designed for students who plan to attend graduate school or enter technical areas. The emphasis is on development of excellent experimental and theoretical skills, excellent oral and written scientific communication skills.

Goals for graduates of this program include

1. Students will be prepared for success in graduate study or employment in technical fields.
2. Students will be expert in experimental techniques, design and analysis.
3. Students will have good oral and written scientific communication skills.

Student Learning Outcomes include

1. Students use appropriate computational techniques to solve problems in mechanics and electromagnetism. [This SLO is unique for the BS in Physics].
2. Students are able to answer questions on the level of the Physics GRE.
3. Students are competent in a range of experimental techniques and they use them effectively.

Unit or School Mission
Vision
“Our vision is to be a community of teacher-scholars committed to creating an environment of excellence that supports and nurtures students as scholars and encourages learning within the framework of a broad liberal arts and sciences education.”
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
- Accountability and assessment as key tools to drive continuous improvement

Our bumper sticker mission is " Integrating discovery, innovation and education and our nation."

Comments and Attachments
For all of our program goals, the departmental assessment committee recommends:
- Between departmental expectations, the guidance provided by faculty mentors, and students taking the target courses.

- 2014Curriculum_Map
- Associate Dean Comments and Completed Rubric

Program follows specialized accreditation standards: ☐
Name of accrediting organization:
Date of last program review for the accrediting organization:

Related Items
There are no related items.

7: Comprehensive Physics Knowledge

Program Goal or SLO
Students are able to answer questions on the level of the Physics subject test of Graduate Record Exam.
A standard Major Field Test was administered for this SLO. The results are summarized below.

Number of Students: 3

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<tr>
<th>Student Classification</th>
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<th>Total Score</th>
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APPENDIX D: ASSESSMENT REPORT

<table>
<thead>
<tr>
<th>Student</th>
<th>% of Questions Answered Correctly (For the entire Group)</th>
<th>Student classifications:</th>
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<tr>
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<td>2: Astrophysics BS</td>
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</table>

Assessment Method / Purpose

Students will take a test of prior knowledge on the level of the Subject GRE exam. The test was given to graduating seniors during the final exam period.

A level of 70% correct answers will indicate a successful level of achievement.

The test will be compiled from GRE study guides and published GRE exams. It will cover: classical mechanics, quantum mechanics, thermodynamics, nuclear physics, optics, waves, special relativity, electromagnetism, special topics and laboratory methods.

Assessment Results

Only three students participated in taking the Major Field Test and it is difficult to conduct a statistical analysis based on three data points.

Use of Results

It is difficult to motivate students to take the Major Field Test even with incentives. However, if this test is part of a course work or a degree requirement more students would be motivated to participate in taking the test so better statistical analysis can be done.

Budget Changes

Comments and Attachments

Related Items

There are no related items.
# 8: Experimental Techniques

## Program Goal or SLO
Physics majors expertly design and carry out experiments to solve problems.

## Assessment Method / Performance Expected
Physics majors independently design an expert approach to solve a given problem in a laboratory.
Assessment of this SLO will be carried out through evaluation of capstone research reports completed by Physics BS majors as part of PHYS 420 or PHYS 499. Assessment includes the design as well as experimental skills and appropriate analysis of the results. These projects were assessed using the following rubric:

## Assessment Results
### Learning Outcome II: Using experimental techniques to solve problems

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<tr>
<th></th>
<th>Clear statement of the problem</th>
<th>Appropriate experimental method</th>
<th>Implementation of the experimental method</th>
<th>Understanding of the theoretical basis of the analysis</th>
<th>Reporting of the result</th>
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<tr>
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</table>

## Use of Results
In general, the experimental techniques used in the attached Phys 420/499 capstone projects are strong.

## Budget Changes

## Comments and Attachments
Related Items
There are no related items.

9: Computational Analysis Techniques

Program Goal or SLO
Students use a computational program such as Mathematica to solve problems in electromagnetism.

Assessment Method / Performance Expected
Assignments requiring solutions with Mathematica or a similar program will be in PHYS 407. The assignments will be assessed on correctness, proficiency and proficiency expected.

Assessment Results
Learning Outcome II: Using computational/analytical/statistical analysis techniques

<table>
<thead>
<tr>
<th>Clear statement of the problem</th>
<th>Appropriate Computational/Analytical/Statistical method</th>
<th>Implementation of the computational/Analytical/Statistical method</th>
<th>Use of tool and use of knowledge of theoretical background</th>
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Use of Results
In general, the experimental techniques used in the attached Phys 420/499 cap...

Budget Changes

Comments and Attachments
  Related Items
  There are no related items.

Program Improvement Summary FY 2014
  Summary of assessment results with focus on program improvement (to be shared publicly)
  Related Items
  There are no related items.
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<td>Wyatt, Justin &amp; Himes, Richard</td>
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<td>DiBona, Winslow</td>
<td>Fragil, P. Chris</td>
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<td>Woodruff, Chelsea</td>
<td>Vance, Jason</td>
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APPENDIX F: STUDENT RESEARCH ABSTRACTS

Abstracts 26th Annual Poster Session - Thursday, April 17th 2014

1. Mission to Venus
Mai-Trinh Pham, Zachary Griggs, Chris Johnson, and Taj Ballinger, Department of Physics and Astronomy

The Mission To Venus (MTV) team proposes a planetary mission to: 1) search for evidence of current Venusian volcanic activity; 2) search for specifics about rocks and volcanic activity type at Iduun Mons; 3) identify specifics of Venusian surface structures; in an effort to better understand the contributors to Venus’s greenhouse effect. Previous observations indicate that Venus’ environment was forged by hostile greenhouse processes. When will Earth reach the tipping point where liquid water no longer exists and our current greenhouse effect will spiral out of control? What are the limits of the equilibrium on our planet to counter this devastating outcome? This mission proposes a year-long orbiter, 6 month-long balloon, and an hour-long lander mission to Venus, with science accomplished by magnetometers, an Alpha Particle X-ray Spectrometer (APXS), Gas Chromatography Mass Spectrometer (GCMS), thermal imager, descent imager, panoramic camera, drill camera, drill sampling system, and a radar system.

2. Ishtar Flagship Mission to Venus
Elliott Harrington, Angela Dapremont, and Winslow DiBona, Department of Geology and Environmental Geosciences

Can Venus provide clues to Earth’s early history? Venus has a wide range of geologic and atmospheric characteristics of interest for an exploration mission. Tectonic and volcanic activity over the course of the planet’s history can provide insights into planetary evolution, as can the study of surface and atmosphere interactions. We will implement an orbiter, two atmospheric balloons, and one lander to study Venusian characteristics. The primary landing site is located in Ishtar Plateau where balloons will permit the study of surface and atmosphere interactions and present day atmospheric conditions.

Proposed instrumentation includes radar imaging (InSAR), spectroscopy (Vis-NIR, APXS, LIBS), atmospheric composition (NGIMS, ASPERA-4), and seismology (Viking 1 Seismometers). This instrument package will allow for successful accomplishment of goals set by NASA, and will result in a greater understanding of the complexity and history of Venus and Earth.

3. EVOLVE: What can only Venus teach us?
Ryan Sullivan and Madysen Cheek, Department of Physics and Astronomy

The Exploring Venus’s Origin and EvoLution Via invEstigation (EVOLVE) mission is a multi-platform, scientific expedition that will conduct an energetic investigation of the planet Venus for four years. The transformation of energy from one form to another on the Venus may be characterized by studying its atmosphere and surface. Weather phenomena, such as the general circulation, will be explored in order to shed light on how momentum is transferred in the atmosphere. Measurements of the electromagnetic and mass spectra of the Venusian atmosphere will place constraints on its vertical and spatial chemical compositions. Surface and atmospheric temperatures will be monitored to parameterize the vertical and spatial distribution of heat on the planet, and to search for active volcanism. Visible and spectral imaging will be taken during descent by the aerial-surface element; this will produce unprecedented images of the Venusian landscape. The EVOLVE mission spacecraft is scheduled to launch in 2024.

4. The Snapping Shrimp, Alpheus angulosus: A New Model System for Studying Neural Development and Plasticity
Patricia Cooney, Erica Tracey, Melissa Hughes, and Chris Korey, Department of Biology

We are interested in developing the snapping shrimp, *Alpheus angulosus*, into a new laboratory model because of its brief embryonic development and relatively large embryos. As an adult, this species demonstrates lateralization of its two claws: one large snapping claw, and one smaller pincer claw. When threatened, the shrimp can switch claw lateralization by dropping its snapping claw and transforming the former pincer claw into a snapper. This process requires extensive rewiring of both motor and sensory neural components. Characterizing the neural development from embryo to adult will reveal how neural asymmetry in the claws develops and help us to understand the evolution of crustacean nervous systems. In this study, we observed embryonic nervous system development using antibody that highlights neural pathways. Thus far, we have examined embryos spanning Day 5 through Day 17 of development and will present initial characterization of the stages of neural development in *A. angulosus*.

5. A Four Doublet Higgs Model
Timothy B. Hayward and Gardner Marshall, Department of Physics and Astronomy

We present an extension of the Standard Model that includes four separate Higgs bosons. Models like this are motivated by the fact that the single Higgs boson in the Standard Model is only the simplest possible case and it is very likely that more complex scenarios exist. In this model the up-like quarks, down-like quarks and leptons all receive their mass through interactions with separate Higgs bosons. The masses, couplings and branching ratios of all particle content were investigated throughout parameter space. These predictions were checked against a number of experimental constraints and the model was found to be in agreement with all experimental restrictions.

6. Architectural Damage to Public Buildings due to the Earthquake of 1886
Nicole Anderson and Steven Juame, Department of Geology and Environmental Geosciences

The effect of the 1886 earthquake in Charleston on 7 public buildings were investigated and mapped in a Geographical Information System (GIS). Historical photographs were used to estimate the extent of the damage, and each building was given a ranking from 1-4 based on damage rankings in FEMA’s HAZUS natural hazard loss estimation software (1 being slight damage and 4 being complete damage). Out of 7 commercial buildings researched, 1 building was ranked 1 (slight damage), 3 buildings were ranked 3 (extensive damage), and 3 buildings were ranked 4 (complete damage). This data was added to a GIS map of damage to residential and commercial buildings previously created by K. Miner. For the buildings in this study, it was found that all were built on the same soil type, so variation in damage is largely due construction differences, and not the kind of soil they were built on.

7. The Role of the Lateral Habenula in Behavioral Inhibition
Zana Elmaasarani, Peter Vento, and Thomas Jhou, Department of Biology

An individual's ability to withhold responses that lead to behavioral inhibition is impaired after extended exposure to drugs of abuse. Our group has recently found that lesions of the rostromedial tegmental nucleus (RMTg), a midbrain region implicated in aversive responses, causes impaired behavioral inhibition in rats. It remains unknown what other brain regions contribute to the broader neural circuitry mediating this effect. The lateral habenula (LHb) sends dense excitatory projections to the RMTg, demonstrating similar responses to aversive stimuli. Accordingly, we hypothesized that the LHb plays a similar role in behavioral inhibition. Testing this, rats received electrolytic or sham lesions in the LHb and
were tested for abilities to withhold lever-pressing responses for food reward while facing punishment via increasing footshock. Unlike RMTg lesions, we found no effect of LHb lesions on shock tolerance, suggesting that other regions are responsible for driving the RMTg role in behavioral inhibition.

8. Using shadowgraph method to investigate concentration-driven fluctuations in gold, silver, and silica colloidal suspensions
Danielle Masse and Ana Oprisan, Department of Physics and Astronomy

The direct visualization and analysis of concentration-driven fluctuations in nanocolloidal suspensions provide invaluable information about cooperative phenomena and the role played by fluctuations in a free diffusion process. Non-equilibrium concentration fluctuations in three nanocolloidal suspensions (silica, gold and silver) were recorded using a shadowgraph technique. A dynamic structure factor algorithm was used for image processing to compute the structure factor and the correlation time of the fluctuations. Based on the correlation time analysis we found the diffusion coefficients of each colloid. We compared the characteristic length and lifetime of these fluctuations using spatio-temporal sections of fluctuating images. Through this comparison, we found that the temporal fluctuation lasted longest in silver colloidal suspension and have the largest characteristic length in gold colloidal suspension. The analysis of these fluctuations allows us to gain more knowledge about the solubility, mobility, spatial and temporal evolution, therefore furthering the biomedical applications of these colloids.

9. A Preliminary Analysis of Complex Gamma-Ray Burst Pulses
Thomas Cannon and Jon Hakkila, Department of Physics and Astronomy

We present a preliminary analysis of previously unstudied gamma-ray burst pulses. Our sample consists of gamma-ray bursts observed between December 19, 1995 and February 2, 1997 by the Burst and Transient Source Experiment (BATSE) on NASA’s Compton Gamma-Ray Observatory. We found that the properties of these pulses are consistent with those of previously isolated pulses, despite the fact that the activity of Bursting Pulsar GROJ1744-28 caused BATSE’s trigger to be set higher than any other time during its decade long mission. This activity created the unique sample set of gamma-ray bursts mentioned previously.

10. - Award of Merit - Sorption and Transport of Sildenafil in Natural Soils
F. Garrett Boudinot and Vijay M Vulava, Department of Geology and Environmental Geosciences

Pharmaceutical Chemicals (PCs) mainly enter our ecosystems from discharged treated wastewater and have direct effects on the ecological health of that area. Sildenafil citrate (Viagra) is one such PC, whose presence has been reported in stream waters. Although one study has shown that sildenafil is not harmful to bacterial and fungal environments, there remains much unknown about its fate elsewhere in ecosystems. Given that sildenafil consumption (and concurrently disposal) is on the rise, it is essential that its behavior in the natural environment be better understood. The goal of this study was to quantify the sorption and transport of sildenafil in differing natural soils with varying compositions. Overall data indicate strong sorption of sildenafil to all soils, but stronger sorption to clay-rich soils. Strong soil sorption acts as a filter for water. These results suggest that little sildenafil will reside in groundwater once exposed to natural soils.

11. The Explorer Project
Robert Bryant, James Carroll, Evan Kosin, and Diana Luu, Department of Computer Science
Open Source software is a community based approach of software development that ensures free and open use to all people. One of the most rapidly expanding subsets of Open Source software is video games. Video games are often a reason that younger software consumers transition to software producers. This project is an opportunity to start and grow an Open Source project centred around a video game that allows participants in the community to access a modular code base that is easy to extend. The LÖVE 2D game engine was used as a well documented base for the game. Community standards for documentation and coding practices were created as well as a expandable base for community members that follow. A community wiki, GitHub repository and issue tracking system, IRC channel, and public Facebook page were created to allow for new community members to join the project.

12. Mapping Eruption Facies from Cinder Cones and Associated Flows Using LiDAR, SW Utah
Robin Banner and Robert Nusbaum, Department of Geology and Environmental Geosciences
Basaltic volcanoes are among the most common continental volcanic landforms. Due to their complex eruptive histories and processes, morphologies range from small pyroclastic mounds to extensive shield volcanoes. For this study, nine basaltic cinder cones in southwestern Utah were mapped using LiDAR data, existing geologic maps, and age data from the Utah Geologic Survey. Relationships between age, morphology, and composition were examined. Our results suggest that relative age dating based on cone slope is unreliable. Vegetation cover and cone age were also found to correlate poorly. Slope and vegetation appear to be controlled by micro-climate and degradation. Flow compositions revealed a pattern of increasing silica-content and alkalinity moving northward; northern magmas could be derived from sources with greater continental crust input, which is consistent with the greater abundance of quartz xenocrysts observed. Finally, flow length was correlated with calculated effusion rate rather than slope or variation in basaltic silica content.

13. Shoreline Change and Sediment Dynamics after Renourishment of Folly Beach, South Carolina
Robin Banner, Department of Geology and Environmental Geosciences
Folly Beach County Park, SC has a long history of chronic erosion. The park was renourished in 2013 and a terminal groin was built to prevent longshore transport of sediment. Bimonthly elevation surveys and photography were utilized to determine post-renourishment sediment dynamics. Our results revealed that immediately following the renourishment, lateral deflation lessened the beach slope. Afterwards, longshore transport to the southwest caused sand to accumulate updrift of the groin. The groin appears to be most successful at retaining sediment up to 350 meters updrift. Sand also migrated around the groin and was deposited on the upper beachface. However, as available updrift sand decreases, erosion south of the groin increases. The groin’s overall effect on downdrift beaches has yet to be determined. Dunes are also important in regards to maintaining a recreational beach. The dunes’ seaward extent has decreased dramatically and dune elevation has remained constant throughout the project period.

14. Neuroprotective effects of rasagiline in a double lesion model of Parkinson’s disease
Kelsey Cantwell, Heather Boger, Claudia Umphlet, Aurélie Ledreux, and Ann-Charlotte Granholm, Department of Psychology and Program in Neuroscience, Department of Neurosciences and the Center on Aging, MUSC
Most published work with the monoamine oxidase (MAO) inhibitor rasagiline and disease modification in Parkinson’s disease (PD) has focused on the classical models of PD, including motor deficits associated
with unilateral 6-OHDA (dopamine neurotoxin) lesions in rats. However, these models do not take into account the cognitive dysfunction seen with Parkinson’s disease (PD). We have utilized a model for progressive loss of both locus coeruleus noradrenergic neurons (LC-NE) and substantia nigra dopaminergic neurons (SN-DA) in rats, mimicking the cognitive and motor function impairments observed in PD. We hypothesize that rasagiline, and its metabolite, aminoindan, will have neuroprotective effects on cognitive and motor symptoms. Fischer 344 male rats were administered DSP-4 (a norepinephrine toxin), followed by bilateral intrastriatal 6-OHDA injections. Three weeks following, either rasagiline, aminoindan (3 mg/kg/day) or saline were delivered subcutaneously. Rats were tested in cognitive and motor function tasks three weeks into the drug treatment. Double lesioned rats treated with rasagiline and aminoindan exhibited increased motor velocity in a spontaneous locomotion task and enhanced performance in a novel object task. We conclude that rasagiline and aminoindan enhance spontaneous activity, exploratory behavior, and cognitive function. Supported by a grant from TEVA Neuroscience.

15. Modeling the Response of Neurons to Unconventional Stimuli
Davy C. Vanderweyen, Derek R. Tuck and Sorinel A. Oprisan, Department of Physics and Astronomy

Neurons are excitable cells that act as information processors by responding to changes in their electrochemical surroundings. These alterations set into motion a series of events that ultimately leads to a change in the voltage of the neurons. Thus affecting the likelihood that the neuron will produce action potentials, which are small propagating electrical impulses produced to relay information. We used a Hodgkin-Huxley model to investigate the effects that different types of stimuli characteristics have on the response of the neuron.

Our results suggest that the neuron modulates its frequency proportionally to changes in stimulus amplitude, but there is no linear relationship with changes in stimulus duration. We also observed that injecting the same amount of charge into the neuron yields different results based on the pulse’s geometrical shape. Our results also infer that information is encoded by modulating the duration of the depolarization and repolarization of the action potential.

16. Sorption and Transport of Diphenhydramine in Natural Soils
Casey J. Rutherford and Vijay M Vulava, Department of Geology and Environmental Geosciences

Diphenhydramine- an antihistamine - is a pharmaceutical chemical that has been detected in streams and groundwater as a result of sewage overflows, runoff, or sewage treatment facilities unequipped to remove trace levels of pharmaceuticals. The objective of this study is to measure chemical binding and transport behavior of diphenhydramine in natural soils and determine its reactivity to soil components. Studies were conducted in the laboratory using natural soil collected from the Francis Marion National Forest. Equilibrium chemical binding patterns and reaction kinetic rates were measured using batch reactors, while transport behavior was measured using chromatographic column experiments. Kinetic experiments showed that diphenhydramine bound strongly to the clay-rich soils and reached equilibrium after seven days, compared to kinetic reaction rates of ten days in organic-rich soils. The results have implications for how diphenhydramine move in different soil environments, and eventually affect larger ecosystems.

17. Patient Specific Induced Pluripotent Stem-cells for Geotrophic Atrophy
Jacquelyn Joseph, Linda Jones and Mark Fields
Age-related macular degeneration (AMD) is the leading cause of blindness in the Western World. This vision loss stems from retinal photoreceptor cell death in the macular region of the retina. Mark Fields and his team are conducting research aimed to restore retinal function in those patients with advanced AMD. Rather than use embryonic stem cells for cell replacement therapy, they are using induced pluripotent stem cells. The idea behind iPSCs is that they are not controversial, as embryonic stem cells are, and they are not foreign to the patient’s body, avoiding the problem of implant rejection. They have been able to get confirmed stem-cell-like cells formed from skin-punch biopsies and are now looking working on their next objective: successful implantation of these iPSCs and restoration of the macula.

18. Using Hyperspectral Remote Sensing Data to Determine Phytoplankton Density in the Coastal Waters of Long Bay, SC
Elliott Harrington and Adem Ali, Department of Geology and Environmental Geosciences

The southeast coastal region is one of the fastest growing regions in the United States and the increasing utilization of open water bodies has led to the deterioration of the aquatic ecology, placing the future of these resources at risk. In coastal zones, a key index that can be used to assess the stress on the environment is the water quality. This is heavily influenced by optically active constituents (OACs) such as phytoplankton, total suspended matter, and colored dissolved organic matter. To support the sustainability and to better manage the resources, water resource managers need enhanced capabilities to monitor and understand the state of the conditions of water quality. Satellite remote sensing of the marine environment has become instrumental for environmental monitoring and impact assessment. In this study, a suite of ocean color algorithms are applied to high resolution sensor data to predict OACs in the coastal waters of SC.

19. Quantitative analysis of ECM proteins in vascular cell aggregates for application to scaffold-free tissue engineering
Cassandra Awgulewitsch¹, Agnes Nagy-Mehesz², Zoltan Hajdu², and Richard Visconti²
¹Biology Department and the Honors College
²Department of Regenerative Medicine, MUSC

Some medical conditions involve blood vessel damage; conventional treatments and even cutting-edge engineering methods face major drawbacks. Scaffold-free tissue engineering is an alternative engineering method in which the patient’s own cells are used to form blood vessels. These vessels must be both strong and elastic enough to withstand blood pressure. A functional extracellular matrix (ECM), composed of proteins, provides this strength. The goal of this project was to assess how different cell types in aggregates influence production of ECM proteins. We fabricated four groups of aggregates: (1) smooth muscle cells (SMCs), (2) SMCs with serotonin, (3) SMCs with endothelial cells, and (4) SMCs, endothelial cells, and fibroblasts. We evaluated ECM protein production using the western blot procedure. Mixed aggregates in Groups 3 and 4 showed increases in ECM protein production compared to Group 1 aggregates. These results provide insight into the best cell type combinations to achieve optimal ECM production.

20. Award of Merit - General Relativistic Radiation Hydrodynamic Numerical Simulations of Multidimensional Accretion onto a Black Hole
Ally Olejar and P. Chris Fragile, Department of Physics and Astronomy

We use the state-of-the-art, astrophysics numerical code Cosmos++ to gain insight into black holes and black hole accretion disks. We investigated black hole accretion disk systems which exceeded the Eddington Limit, the maximum luminosity an astronomical object can have while maintaining hydrostatic equilibrium. Astronomers have observed objects (particularly black hole systems) that exceed this luminosity, which suggests that the proposed Eddington Limit may not restrict nature at all. We look for inhomogeneities in these accretion flows that may facilitate energy and mass loss, enabling the system to maintain equilibrium while exceeding the Eddington Limit. Throughout all simulations we note how much matter reaches the black hole compared to how much matter is caught in the outflows.

21. Characterization and Quantification of black carbon in wetland soils in Big Cypress National Preserve in Southwest Florida
Kyle Bostick and Vijay Vulava, Department of Geology and Environmental Geosciences

Black carbon (BC), partially combusted organic matter, is resilient to chemical, thermal, and biotic degradation. BC participates in environmental processes such as chemical sorption and long term carbon storage. BC quantity and characteristics was analyzed for the Big Cypress National Preserve (BCNP). 12-inch cores were extracted at ecologic boundaries along Turner River in BCNP. Ten grams of sample from each core were processed with a chemo-thermal-oxidation method, where BC was quantified. BC was imaged via SEM and characterized as charcoal or soot. Charcoal particles are large (400-900 µm) and retain cellular structure. Soot particles tend to be small (5-10 µm) and are semi-spherical particles. Soot was abundant in the sawgrass soils, ~13 wt. % BC. Pineland soils, were mostly enriched with charcoal particles, ~7 wt. % BC. It is possible to use BC as a proxy for the history of wildfires and climate change.

22. The Batwing: The Catalyst Gotham Deserves
Carson W. Reed, Travis P. Varner, Richard A. Himes, and Justin K. Wyatt, Department of Chemistry and Biochemistry

During the synthesis and development of new carbon-carbon bonds in molecules (such as polymers and pharmaceutical drugs), it is vital at times to utilize a catalyst that will exhibit control over the reaction and the stereochemistry of the desired product. More specifically, organometallic complexes of this nature are currently being used to catalyze the formation of polysterenes. A novel bis-indenyl “batwing” ligand metal complex is being designed and synthesized to increase the control on stereochemistry when synthesizing such polymers. Further modification of the batwing ligand with chiral moieties may also lead to enhanced enantioselectivity.

23. Spatial and temporal expression of karyopherins IPO5 and IPO13 in the sea urchin Lytechinus variegatus
Ross Baker and Melanie Overcash, Department of Biology

The karyopherin-beta family of transport proteins binds to other proteins and transports cargo into the nucleus through the nuclear pore complex, making them essential for basic cell functions. This study focuses on characterizing the temporal and spatial expression of karyopherin-beta proteins importin 5 and importin 13 in the sea urchin Lytechinus variegatus, through the process of reverse transcriptase PCR (RT-PCR) and in situ hybridization. In other organisms, we know that importin 5 is necessary for the transport of histones that package DNA into nucleosomes and that importin 13 facilitates transport of
translational initiation factor 1A. Hopefully, through these studies, we will be able to determine when and where these genes are expressed in the developing embryo of *Lytechinus variegatus* and form preliminary hypotheses about their roles in developmental processes. This information may also expose new and previously unknown roles of these transport proteins pertinent to the development of other organisms.

24. The Effect of Noise on Timing Network Response
Derek Novo¹, Sorinel A. Oprisan¹, and Catalin V. Buhusi²

¹Department of Physics and Astronomy
²Department of Psychology, Utah State University

Timing in the seconds-to-minutes range (interval timing) is crucial for rate estimation, decision-making and foraging and has been demonstrated in many species, from invertebrates to vertebrates. Deficits in interval timing have been reported in a series of neurological disorders, including Parkinson’s, Huntington’s, and schizophrenia. We implemented a computational model of interval timing that mirrors the thalamo-cortico-striatal loops involved in interval timing. Our striatal beat frequency (SBF) model correctly reproduces peak interval (PI) experimental results. We showed that, in the presence of noise, the output is (i) Gaussian, (ii) accurate, and (iii) has a width proportional to the criterion time $T$.

25. Energy-Efficient Lighting in Theatre: Are Smart Reflectors an Answer?
Benjamin Fetterolf and Linda R. Jones, Department of Physics and Astronomy

The halogen incandescent lamp is the industry standard in theatre spotlights because of excellent color rendering, throw, and natural color shifts while dimming. Unfortunately, a good deal of their energy is wasted as heat. Consequently, replacement bulbs such as light-emitting diodes and compact-fluorescent lights are being developed for theatre lighting. However under the dynamic conditions of theatre, there are still problems to be overcome. In this research, possible enhancers of LED light—a simulated diffraction grating (compact discs), a prism, and colored reflectors—were tested. It was found that the colored reflectors make the most pronounced and selective difference in the output. Therefore it is proposed that future research focus on the design of tunable colored reflectors to selectively alter regions of the LED output spectrum to create more natural-appearing light and more natural shifts in light during dimming.

26. The Influence of Carbon Nanotubes on Solvent-Driven Polymer Assembly
Philip Philiphose and David Boucher, Department of Chemistry and Biochemistry

Composites of poly(3-hexylthiophene) (P3HT) and carbon nanotubes (CNTs) are promising candidates for next-generation, polymer-based photovoltaic and thermoelectric devices. The structural order (crystallinity) of P3HT/CNT assemblies formed in solution is significant in determining the morphology and photophysics of the photoactive solid-state materials. To control the structural order within P3HT/CNT systems, we exploited the properties of binary solvent mixtures to drive the assembly of poly-(3-hexylthiophene) (P3HT) into nanofibrillar structures that may incorporate CNTs as a nanoscale scaffold. We used absorbance spectroscopic techniques to investigate the differences between the crystallinity and the kinetics of formation of P3HT assemblies and P3HT/MWNT nanohybrid structures in several binary solvent mixtures.

27. Exploring Adaptive Gain Theory through Economic Demand
J. I. Osborne, B.S. Bentzley, Z.A. Cope, E. Vazey, B.L. Roth and G.S. Aston-Jones

1Department in Psychology and Program in Neuroscience, College of Charleston
2Department of Neurosciences, Medical University of South Carolina
3Department of Pharmacology, University of North Carolina

Adaptive gain theory suggests that explorative-exploitive behavior observed in response to changes in task demand and utility is correlated with tonic firing of the locus coeruleus. We employed a within-session behavioral-economic procedure to assess changes in demand for cocaine as a function of price. The maximum price that maintains increases in response rate is \( P_{\text{max}} \). We hypothesized that increased tonic discharge of locus coeruleus-noradrenergic neurons would initiate task disengagement at a lower \( P_{\text{max}} \). Locus coeruleus-noradrenergic neurons were tonically activated using an excitatory DREADD (Designer Receptors Exclusively Activated by Designer Drugs). After self-administration training, animals were randomized to receive one of three doses of the selective DREADD agonist, clozapine-N-oxide before testing. A decrease in \( P_{\text{max}} \) in response to CNO would provide evidence for a causal role of the locus coeruleus in modifying behavior in response to changing task demands and utility. A trend toward CNO decreasing \( P_{\text{max}} \) was observed (\( n=5, p<0.10 \)).

28. Post Mortem Muscle Softness in the Spotted Seatrout *Cynoscion nebulosus*: Effect of the Myxozoan parasite *Kudoa inornata*

Candice Alge, Eric McElroy, and Isaure de Buron, Department of Biology

*Kudoa inornata* is a myxozoan that infects the skeletal muscles of the spotted seatrout, *Cynoscion nebulosus*. A previous study in our laboratory indicated that infected wild fish displayed increased post mortem flesh softness when compared to non-infected fish (mariculture raised). We hypothesized that infection by *K. inornata* was at the origin of the difference in flesh softness observed. Plasmodium density, plasmodium area, and spore density were determined from biopsies of seatrout previously tested for muscle softness (3 biopsies per fish, \( N=33 \)). Results indicated that spore density was positively correlated with plasmodium density and area. Although muscle softness was not correlated with spore and plasmodia densities, data suggest that the larger the plasmodia, the softer the muscle is. Hence, the older the infection in a fish, the higher the post mortem muscle softness may be. Since old infection may occur in larger (older) fish, this may be of concern to anglers.

29. - Award of Merit - A Musical Introduction to Functional Programming: Teaching the Nyquist Programming Language within Audacity

Joseph Black, Matthew Lannan, Justin Wooton, and John Youngblood, Department of Computer Science

Computers and technology have become ubiquitous in society; this fact has forged the belief that the study of computer science must become an essential aspect of basic education. Unfortunately, fundamental computer science instruction is rarely offered prior to the later stages of education; and even so, purportedly entry-level textbooks and materials are still tailored to computer science academia and not necessarily easily digestible by non-academics. To help encourage computer science education among those who may not have necessarily had the opportunity to learn the basics, an alternative type of introductory textbook for functional programming was devised. This online textbook uses music as a means to an end; that end being fundamental computer science education. Using Nyquist - a sound synthesis functional language - with Audacity - an open-source digital audio workstation - this textbook compels the interested musician to become the future computer scientist.

30. Acute toxicity of naproxen and its degradants on southern toad tadpoles
Pharmaceutical pollution is an emerging environmental issue. Many pharmaceuticals that pass through the body are not completely removed during wastewater treatment, and are ultimately released into the environment. Naproxen, a widely used pain reliever, has been detected in natural waterways around the world. When exposed to sunlight, naproxen is converted into two compounds, known as photodegradants, which are predicted to be more toxic than naproxen itself. We tested the toxicity of these three compounds on southern toad tadpoles during acute (96 hours) and chronic exposures (until metamorphosis). Acute toxicity of the second photodegradant proved to be six times more toxic than both naproxen and the first photodegradant. During chronic exposures at lower concentrations, both photodegradants reduced tadpole survival and growth to metamorphosis, while all three compounds reduced tadpole survival through the metamorphic phase. These results suggest that the degradation of naproxen in the environment may increase risk to freshwater organisms.

31. The Effect of Temperature Change on Oxygen Binding to Hemoglobin
Allison Sullivan and Linda Jones, Department of Physics and Astronomy

Low level light therapy is a medical treatment that utilizes near-infrared light for the relief of chronic pain and inflammation as well as the stimulation of wound healing. The purpose of this study was to determine whether changes in temperature caused by illumination could be the major factor in the effectiveness of near-infrared light therapy. In this project, isolated hemoglobin was placed in an air-tight container where it was then treated with heat. Temperature, dissolved oxygen, and bound oxygen were monitored simultaneously with the use of a temperature probe, a fiber optic dissolved-oxygen probe, and a fiber optic reflectance spectroscopy system. The data concluded that increased temperature resulted in a decrease of bound oxygen and an increase of dissolved oxygen from the hemoglobin. In order to confirm the role of temperature, the results of a preliminary experiment of oxyhemoglobin treated with illumination will also be presented.

32. Statistical Analysis of Raindrop Arrival Times
Cassidy Jenks and Michael L. Larsen, Department of Physics and Astronomy

Commercial raindrop disdrometers are readily available but expensive. Consequently, a low-cost alternative capable of resolving individual raindrop arrival times and sizes is desired. An audio recording was taken from beneath a metal pan in the rainfall. This recording was used to create a time series of arrival times. Then, a statistical analysis of raindrop arrival time was completed. Results from rainstorm data taken in early 2014 are consistent with current rain theory, however more precise data with a smaller dead time is desired.

33. Developing for an Open Source Software Suite
Hannah Lyhne, Jeremy Jones, Tomoko Goddard, Joshua Bruce, and Steven Pilkenton, Department of Computer Science

Libreoffice is an open source free office suite that is very open to outside help. The software is obtained by anyone that wants to develop through github which is a repository that makes it easy to keep up with different versions of software. Our team started with summarizing comments on the development wiki to ease bug fixing for developers. Soon after we started to look at bugs to fix ourselves after the most
recent update. Our bug fix focus has been on an error with the right to left nature of other languages in their writing software.

34. Implementing the Galerkin Method in Cosmos++
Thomas Briggs and Chris Fragile, Physics and Astronomy

The Nodal Discontinuous Galerkin Method (NDG) is a finite element method by which systems of partial differential equations can be solved with a higher degree of accuracy compared to the finite difference and finite volume methods currently used in Cosmos++, Dr. Fragile's astrophysical code. Currently, an extensive C++ library is under construction with the capabilities to solve one-dimensional systems of partial differential equations utilizing the NDG method. The ultimate goal is to provide an option within Cosmos++ to select either a finite difference or NDG method by which to solve the desired equations.

35. KiwiIRC
Paul Shahid, Sydney Aiken, Chris Taylor and Randy Jiminez, Department of Computer Science

KiwiIRC is a lightweight and versatile open source web based IRC client. It allows users to open a browser window and begin chatting, without the need for downloading files or installation of software. Many online communities use IRC, and the feature rich and free KiwiIRC is a great solution. Contributors are able to improve features or correct bugs through GitHub by submitting pull requests. Pull requests are then reviewed and discussed by the creators for possible integration. Several bugs were addressed for KiwiIRC, with some being accepted into the code base. The example bug, #381, would show the server page, instead of the previous tab, whenever a tab was closed. The experience gained by contributing to this open source community has given the group exposure in addition to expanded code and software knowledge.

36. Efficacy of Oxidative Stress Treatments on Human Squamous Cell Carcinomas
Alexander Cattran¹, Linda Jones² and Anna-Liisa Nieminen³
¹Department of Biology
²Department of Physics and Astronomy
³MUSC College of Pharmacy and Biomedical Sciences

I have tested the efficacy of different types of oxidative stress treatments on human head and neck cancer cell (HNSCC) lines both in vitro and in vivo. A large portion of the experiments were run using photodynamic therapy (PDT). PDT is a treatment in which a photosensitizer is used to make tissues and cells susceptible to certain wavelengths of light so that a laser can then be used to target only the cancerous tissues. The main photosensitizer used was phthalocyanine, or Pc4. One challenge of photosensitizers is that they are not specific to any particular tissue; they will diffuse into their surroundings and be taken up by the entire body. One way to overcome this is to use a targeted drug which utilizes nanoparticles to aid in transport into the cancerous cells. The targeted drug was shown to be much more effective in killing the cells.

37. Microplastic Particles in Marine Food Web of Charleston Harbor
Jessica Barber and Philip Dustan, Department of Biology

We examined the abundance of microplastic in the bodies of zooplankton in Charleston Harbor. Plankton net samples were collected at the City Marina, near the mouth of the Ashley River, on an incoming tide. Zooplankton were isolated using size fractionation, digested with strong acid-base
chemistry, and examined with Epifluorescent microscopy. Our results indicate that zooplankton consume microplastic regularly and that there is a high prevalence of microplastic in Charleston harbor implying that it is becoming incorporated into the grazing marine food chain that is the basis of life in the sea.

38. Photodegradation Mechanisms of Vardenafil and Sildenafil
Logan Herbert and Wendy Cory, Department of Chemistry and Biochemistry

An understanding of the solar photodegradation of pharmaceuticals is an important part of assessing the overall environmental fate of these emerging contaminants. Investigations into how they degrade and what new compounds are formed are important in order to assess any potential toxicity to human or aquatic life. In this work we have studied the solar photodegradation of vardenafil and sildenafil, the active ingredients in Levitra and Viagra. Aqueous samples were exposed to simulated solar light then analyzed by HPLC and ESI-LC-MS to determine both the rates of photodegradation and the products of the reaction. Proposed mechanisms for the photodegradation of both compounds were developed from the MS data.

39. Oscillation of circadian genes in response to a simulated tide in the starlet sea anemone, *Nematostella vectensis*
Carissa James and Elizabeth Meyer-Bernstein, Department of Biology and Program in Neuroscience

Animals display endogenous rhythms in physiology and behavior that are governed by a self-sustaining biological clock. The most widely studied of these biological clock outputs, circadian rhythms, have an approximately 24 hour period and are synchronized to the environmental photoperiod. In intertidal marine organisms, non-photic environmental cues such as tidal oscillations can also generate rhythmic behavior. We have observed circatidal behavior in the starlet sea anemone, *Nematostella vectensis*, when exposed to a simulated tide in the laboratory. To determine whether known genes of the circadian clockwork also underlie this circatidal behavior, we have analyzed patterns of gene expression in *N. vectensis*. Presence of a simulated tide concurrent with a photoperiod altered rhythms in gene expression significantly, suggesting a role for known circadian genes in the generation of multiple frequency biological rhythms.

40. - Award of Merit - Experimental infection of a potential cyclopoid vector of *Anguillicoloides crassus*, an invasive parasite of the American eel
Ian M. Hubbard, Jennifer L. Hein, David Knott and Isaure de Buron, Department of Biology

The development of *Anguillicoloides crassus*, an invasive nematode parasite of the American eel, was studied via the experimental infection of a cyclopoid copepod. The life cycle of this worm has never before been studied in North America, where no vectors were heretofore known. L2 larvae from *A. crassus* were obtained from swimbladders of infected eels captured locally. Copepods were collected from Goose Creek and exposed in groups of 10 to larvae at either 21°C (N=4) or 26°C (N=3). After 24 hours, infected copepods were separated and maintained at their respective exposure temperatures to monitor larval development from L2 to L3 stages. Infection prevalence of copepods kept at 21°C and 26°C was 85.6% and 88.9% respectively. Copepod mortality was highest in 72 hours post exposure (50-80% for both temperatures). Larvae grew faster at 26°C and molted into the L3 stage in 6-10 days in contrast to 11 days at 21°C.

41. Preliminary analysis of a hydrothermal vent chimney, El Guapo
M. Montgomery Taylor, Robert L. Nusbaum and Leslie R. Sautter, Department of Geology and Environmental Geosciences

An inactive 1-m tall hydrothermal vent chimney was collected at the base of a massive 17-m chimney, El Guapo, using the robotic vehicle ROPOS from aboard the research vessel Thompson. This small chimney, nicknamed El Lindo, was located on Axial Seamount, an active deep-sea volcano 300 miles off the Newport, Oregon coast. The chimney was collected during the University of Washington’s VISIONS ’13 Expedition, part of the NSF-funded Ocean Observatories Initiative (OOI). Working on a longitudinal ½ slice of the chimney, elemental analysis was performed on fragments of its rind and inner mass using a SEM TM-1000. The chimney’s growth patterns were evaluated and its mineralogy was analyzed, revealing a number of different sulfide and clay minerals formed by hydrothermal alteration of mafic rock present at the volcanic region. Secondary mineralization was also present in the form of vugged-structures on an oxidized rind.

42. Beyond the Habitable Zone
Carter Rhea and Cassandra Runyon, Department of Geology and Environmental Geosciences

The search for extraterrestrial life depends on a deep understanding of geologic processes which create conditions necessary for life. Magnetic fields, plate tectonics, and volcanoes are the most important processes because together they influence the climate of a planet. Planetary climate governs the ability of life to develop on a celestial object. Mars and Europa are prime examples of planets which indicate past or present life that previously or still exhibit a strong magnetic field, volcanoes, and plate tectonics in one form or another. The search for extraterrestrial life should not be restricted to planets within the habitable zone, but rather encompass planets exhibiting the necessary geologic prerequisites for life.

43. Cortisol Levels in Response to Physiological Stressors as a result of Chronic Neuropathic Pain
Shannon Lyons1,2, Chantelle Ferland2, Arthur Riegel2
1 Department of Biology and Program in Neurosciences and Honors College
2 Department of Neuroscience Medical University of South Carolina

The interaction between chronic pain and severe stress is of particular importance considering the increased population experiencing neuropathic pain. We studied the impact of acute and chronic stress on corticosterone levels in rats. Animals underwent spared nerve injury (SNI) surgery or served as sham or naïve controls. The SNI procedure induces physiological stress that can be measured 1 day (acute) or 28 days (chronic) post-surgery. Each animal’s plasma was tested using radioimmunoassay to determine corticosterone levels. While SNI surgery resulted in an increase in corticosterone in both groups as compared to controls, chronic pain rats had a significant reduction as compared to the acute pain rats. The corticosterone reduction in chronic stress rats may be explained by prolonged activation of the hypothalamic pituitary adrenal axis negative feedback loop. This experiment provides insight into the effect of prolonged stress which may lead to future treatment therapies for neuropathic pain.

44. Photodegradation of Loratadine in Simulated Natural Water Samples
Adam Jenkins and Wendy Cory, Department of Chemistry and Biochemistry

The increasing use of prescription drugs and over-the-counter medicines has resulted in the detection of these compounds in our water supplies at trace levels. This has led to concerns about the effects of exposure to the aquatic ecosystem and on public health. In this research, we investigated the environmental fate of a widely used antihistamine, loratadine (LRD.) Studies included the
photodegradation of LRD in aqueous solution with humic acid (HA) to simulate natural water systems. In order to quantitatively and qualitatively study this photodegradation, we measured the solar photodegradation rate of LRD and identified the products of this photodegradation using high performance liquid chromatography (HPLC) and liquid chromatography-mass spectrometry (LC-MS).

45. Sexual dimorphism and size differences between mated and unmated males in the pycnogonid Tanystylum orbiculare
Justin Skinner and Robert Podolsky, Department of Biology

In many species, the male’s role in reproduction is limited to fertilizing eggs. Because females have fewer gametes, males often compete for access to females, and females are often choosier. Darwin recognized that either form of sexual selection can result in sexual dimorphism. Pycnogonids (sea spiders) are unusual because males carry and care for eggs they collect from females. To understand whether this reversal in parental care influences sexual dimorphism in Tanystylum orbiculare, we compared size measurements between males and females and between males with and without eggs. Males were smaller than females in leg but not body size measures. Mated males, however, were larger than unmated males in most body and leg measures. Among mated males, larger males carried greater volumes of eggs. Thus, although larger males appear to be favored by females, this does not appear to have resulted in sexual size dimorphism as predicted by Darwin.

46. Stimulus velocity encoding by primary afferents in the wind-sensitive cercal systems of three cockroach species and the house cricket
Anne C. K. Olsen and Jeffrey D. Triblehorn, Department of Biology and Program in Neuroscience

Extracting information from the environment is an important function of sensory systems. Three species of cockroaches (Periplaneta americana, Gromphadorhina portentosa, and Blaberus craniifer) possess almost identical neuroanatomical makeups, but exhibit different escape responses to wind generated by a predator. These behavioral differences may result in different sensory processing of wind in these species. Previously, our lab discovered that wind evoked more activity in the wind-sensitive interneurons (WSIs) of P. americana and B. craniifer than of G. portentosa. To determine whether these differences in WSI activity related to afferent input, we performed extracellular recordings on the wind-sensitive afferents of the roaches. We also tested the house cricket, Acheta domesticus, to examine the relationship between afferent responses and number of wind-sensitive hairs and further our comparative analysis. Stimulus-Response curves were generated for all species and showed that afferent input contributes to the differences in WSI responses.

47. Phosphorite Analysis and Provenance using SEM, Reflectance Spectroscopy, and Petrography, Charleston, SC
Kyle S. Schultz, and Robert Nusbaum, Department of Geology and Environmental Geosciences

Charleston area phosphorites themselves are largely uncharacterized. The phosphorites in this area range in color from brown/tan to grey/black, referred to as Type 1 and Type 2. This study focuses on the character of eight phosphorites collected from Pleistocene fluvial sand locations. Type 1 samples displayed a higher content of clay minerals, collophane cement, and larger quartz clasts. Type 2 samples were higher in higher carbonate matrix/cement along with collophane and angular quartz clasts. Accessory mineral constituents proved useful for provenance analysis, zircon, allanite, and monazite suggest a granitic source rock. Abundant clay minerals identified using reflectance spectroscopy includes kaosmectite mixtures. The samples collected indicate reworking of originally marine phosphorite
(Paleogene) with terrestrial input. The mineralogy is consistent with a Piedmont provenance, followed by episodes of Ca-phosphate cementation. It appears that clasts in Type 1 and 2 phosphorites have slightly different histories, with greater terrestrial input for Type 1.

Kyle S. Schultz, Department of Geology and Environmental Geosciences

Bathymetric surveys were conducted by the University of New Hampshire to visualize the seafloor of the Arctic Basin. The purpose of analyzing these data is to characterize the bathymetry to facilitate an accurate resolution for the UN Convention of the Law of the Sea (UNCLOS). Bathymetry can be used to reveal sections of ridge systems and other features on the seafloor to determine the continental margin to which sections of the basin belong. These decisions are crucial to identify the extent of Economic Exclusive Zones. The depth of the seafloor in this study area ranges from 1800 to 4000 meters. The shallower portion lies on the border of where a number of previous surveys have been conducted. This shallow region gradually deepens into a broad relatively flat area that contains a channel-like feature with a relief of 20 to 50 meters, and is the primary area of interest.

49. Sorption and Transport of Triclosan in Natural Soils  
Jennifer Brennan and Vijay Vulava, Department of Geology and Environmental Geosciences

Triclosan (5-Chloro-2-[2,4-dichlorophenoxy]phenol) is a complex organic compound that is used as an antibacterial agent in many common personal care products such as toothpaste and soap. Its presence in the environment is entirely a result of human activity, but little is known about the behavior of this chemical in the environment. The main objective of this study was to determine sorption and transport of triclosan in natural soils using column experiments. Experiments showed that triclosan sorbed strongly to soils with the highest organic content, and less strongly in soils with low organic content. Therefore, triclosan can be relatively contained as a pollutant when exposed to organic soils.

50. Photodegradation of Diphenhydramine in Simulated Natural Water Samples  
Aliya Dumas and Wendy Cory, Department of Chemistry and Biochemistry

Consumers are increasingly concerned about the presence of pharmaceutical agents in the public water supply and their potential effects on both aquatic and human life as well as the environment. Active compounds in surface waters are exposed to UV light, which can lead to degradation and the formation of structurally related compounds. Diphenhydramine, a first-generation antihistamine with sedative properties, is found in many commercial allergy and sleep aid products. In this work, the photodegradation of diphenhydramine using simulated sunlight in the presence of humic acid was investigated. Rates of degradation were determined after analysis of samples using HPLC.

51. Synthesis of a Novel Triazole Antibiotic  
Ryan Murphy and Amanda Wimbish, Department of Chemistry

We tested multiple different synthetic schemes in order to design a new triazole antibiotic to be used as a topical agent. 3,4-dimethoxybenzoic acid was first converted into a phthalide through electrophilic aromatic substitution and Fischer esterification. The phthalide was treated with various strong bases but formation of a stable carbanion was not observed. A second synthesis with p-anisic acid involved conversion of the carboxylic acid to an amide, followed by subsequent carbon activation and addition of an aldehyde. Addition of the aldehyde to the aromatic ring was not observed in yields over 30%. A third
scheme included a Michael addition to the aromatic ring of p-anisic acid through ethyl acrylate, which resulted in poor yields.

52. Blind Date Biology: Does it have to be a perfect match?
Joseph Karam\textsuperscript{1}, Jomel Jacinto\textsuperscript{1}, Garrett Mitchener\textsuperscript{2}, Gilbert Ariani\textsuperscript{3}, and Renaud Geslain\textsuperscript{1}
\textsuperscript{1}Department of Biology
\textsuperscript{2}Department of Mathematics
\textsuperscript{3}Architecture et Réactivité de l'ARN, Université de Strasbourg, Institut de Biologie Moléculaire et Cellulaire, Strasbourg, France

Genetic translation is the universal mechanism that allows the biosynthesis of cellular proteins. The main components of this machinery are the ribosome, the messenger RNA, the transfer RNA (tRNA) and the aminoacyl-tRNA synthetases (aaRS). aaRS are responsible for the transfer of 21 different amino acids onto their respective tRNA. tRNA have virtually identical 3D structures which makes tRNA discrimination by aaRS a true molecular conundrum. By textbook standards, we are taught that aaRS and tRNA must perfectly match; however, a growing body of evidences suggests that aaRS - tRNA mismatches happen at a significant rate. This study aims at identifying the subset of \textit{Saccharomyces cerevisiae} tRNA able to interact with \textit{S. cerevisiae} Arginyl-tRNA synthetase (ArgRS). Our approach combines aaRS - tRNA binding assays and screening via tRNA microarrays. This is the first time a genomic approach (as opposed to one tRNA at a time) is designed to study aaRS - tRNA interactions.

53. An Interpretation on Spectra of Various Tephra Samples: A comparison Between Rhyolite and Dacite Compositions
Kristen C. Abberley and Robert L. Nusbaum, Department of Geology and Environmental Geosciences

Reflectance spectra, particle size, and geochemistry were analyzed to identify differences in absorption features between rhyolite and dacite tephra composition. Samples analyzed include tephra from the 1912 Novarupta eruption in Alaska, the 1980 Mount St. Helens eruption, and 760 ka Bishop Tuff (CA). Results indicate that sample grain size directly affects the spectra, yet even when samples of a similar grain size were analyzed, a difference still existed between rhyolite and dacite compositions. Spectral absorption feature depths provided the most diagnostic differences. Possible causes for these differences were further studied using thin sections, published chemical data, and results from particle size analysis. Preliminary interpretation suggests that spectral absorption feature depth is probably a function of water content in the tephra glass. The samples have recently been sent to Washington State University for XRF analysis, which will more accurately determine tephra composition and water content of tephra.

54. Subpixellation and the Hubble DICE Survey
Benjamin Wilson and Joe Carson, Department of Physics and Astronomy

We present a status report on computational improvements made on a sample of stars observed with the Hubble Space Telescope. Our data set is a collection of 11 stars that contain circumstellar debris disks. In particular, we utilize a customized version of a subpixellation protocol known as Drizzle which provides measurable improvements to the quality of our data. This increase in data quality highly correlates to the improved probability of identifying fine disk structures that may indicate the presence of planet formation. These results will directly inform upon the posited planet formation mechanisms that occur after the ~ 10 My epoch of gas depletion, a time in our solar system when giant planets were migrating and terrestrial planets were forming, and directly test theoretical models of these processes.
55. The Gale Crater Mound in a Regional Geologic Setting: Comparison of Wind Erosion in Gale Crater and Within a 1000 km Radius
Angela Dapremont, Carlton Allen, and Cassandra Runyon, Department of Geology and Environmental Geosciences

The Curiosity rover is currently exploring Gale Crater on Mars. A variety of geologic features, including wind erosional features called yardangs, are present at Gale and in the Medusae Fossae Formation (MFF) units within a 1000 km of the crater. This study compares yardangs in two geologic units within Gale to those in the MFF. Yardangs in the lower mound of Gale are consistently N-S in orientation, suggesting an eroding wind from the south during their formation. The upper mound of Gale exhibits more diverse orientations including N-S, NE-SW, and NW-SE. The most abundant yardang orientation in the MFF is NW-SE. MFF yardangs are most closely related to the upper mound of Gale, suggesting a potential correlation in their sediment erosion histories.

56. The effects of the parasites Kudoa inornata and Cardicola laruei, on cold tolerance of the spotted seatrout, Cynoscion nebulosus
David Smiley, Katie Anweiler, and Isaure de Buron, Department of Biology

In the past decade, several large scale spotted seatrout kills occurred in South Carolina’s estuaries. These die-offs appear to be correlated with extremely cold winters. The spotted seatrout, Cynoscion nebulosus, is commonly infected with the parasites Kudoa inornata and Cardicola laruei. The aim of this study was to assess if parasite infection influences seatrout mortality during cold temperatures. Laboratory experiments at SCDNR indicated that seatrout raised in harbor water, and therefore likely to be infected with parasites, died at significantly lower temperature than seatrout raised in water free of parasites. To test if this difference was due to parasites, we quantified the parasite load of infected seatrout. After comparing parasite load at temperature of mortality by regression analysis, results indicated no significant relationship between K. inornatamyxospore density or C. laruei granuloma number and cold tolerance. These findings suggest that parasites do not affect temperature tolerance of spotted seatrout.

57. An Innovative Technique for 3D Imaging Technology
Hannah Wilson and Joseph Carson, Department of Physics and Astronomy

We and collaborators have developed a novel imaging technique that enables 3D imaging from a single digital snapshot, for the purposes of low-cost clinical photography in resource limited settings, such as rural regions in southeast Africa. The technique takes advantage of the emerging technology of light-field photography, which captures the information of multiple focus depths in a single digital snapshot. Our novel software approach reconstructs 3D shapes by evaluating how different parts of the image sharpen or blur at different focal depths. We combine our computational approach with a commercially available light-field camera, Lytro, and a medical hardware adaptor custom-developed by collaborators to ensure controlled and repeatable measurements. Analyzing both calibration images as well as clinical images, taken with our hardware at Maputo Central Hospital in Mozambique, we have been working to evaluate uncertainties on 3D shape and improve overall 3D rendering capabilities.

58. Phenotypic Effects of Glyphosate on Mutant and Natural Populations of Arabidopsis thaliana
Ka'Dedra Creech and Courtney Murren, Department of Biology
Glyphosate, a commonly used herbicide to kill weeds, has been reported to stimulate growth at very low doses. We examined the susceptibility of *Arabidopsis thaliana* that were derived from areas exposed to glyphosate. We obtained 11 accessions and grew them in the greenhouse. Where plants failed to germinate, we transplanted any additional seedlings. After a month, we administered glyphosate treatments of 0 g/ha, 5.8 g/ha, 11.5 g/ha, and 28.8 g/ha. The application of treatments continued at weekly intervals. We collected data on the days to bolt, rosette diameter and height. We found that seeds from a set of Iberian populations did not germinate. Of the remaining populations from Germany, Norway, Spain, Tadjikistan, United Kingdom, United States and Russia we did not detect significant differences in the amount of glyphosate added for height, days to bolt or rosette diameter. Further studies on seed collected from geographic areas that vary in glyphosate exposure are warranted.

59. Temperature Effects on Peroxiredoxin Oscillation in *Nematostella vectensis*
Annemarie C. Galasso, Elizabeth Meyer-Bernstein, Department of Biology

An organism’s biological clock is known to underlie cycles in physiology and behavior. In our lab, we have been investigating the circadian, or 24-hour, clock of the sea anemone, *Nematostella vectensis*. Similar to other invertebrates, *N. vectensis* locomotor activity can be synchronized by temperature oscillations. In order to further establish temperature’s role in synchronizing the circadian clock of *N. vectensis*, we have assessed peroxiredoxin (PRX) protein expression in animals housed in a temperature cycle. Peroxiredoxins are anti-oxidant proteins that regulate intracellular peroxide levels and may serve as a universal marker for circadian rhythms. Temperature-entrained animals were collected at 8 time points across the day and protein levels of PRX were quantified. Results indicate that PRX rhythms are synchronized by temperature in *N. vectensis* with PRX more highly expressed during the lower temperature time points. Our data will provide a foundation for additional investigations into temperature regulation of circadian clocks.

60. Prediction and Annotation of Genomic Repeat Dynamics in the snail Biomphalaria glabrata using Hidden Markov Models
Kelsey Yetsko¹, Andrew Shedlock¹, and Paul Anderson²
¹Department of Biology
²Department of Computer Science

Mobile elements cover an extensive amount of the genomes of both plants and animals. However, current homology, or similarity comparison, based search tools are optimized only for analyzing and annotating repeats in humans and well known experimental models. This skewed taxonomic distribution of reference data makes homology-based search tools less sensitive and less accurate, missing many targets in poorly examined genomically diverse lineages. With these limitations in mind, Hidden Markov Models (HMMs) were used for de novo, rather than homology based, repeat annotation in the gastropod mollusk species Biomphalaria glabrata. Here we compare the HMM profile repeat annotation output to other currently available methods in order to assess whether there is an advantage of using de novo model-driven repeat annotation methods over homology based tools. Finally, to experimentally verify our in silico methods, we used PCR to amplify eight selected independent repeat loci across five clonal individual *B. glabrata* specimens.

61. - Award of Merit - Mitochondrial Photobiomodulation of Cytochrome c oxidase (Cox) in *Arabidopsis thaliana* Knockouts
Taylor Hammock¹, Linda Jones², and Mark Lazzaro¹
¹Department of Biology
The cellular mechanism underlying wound healing and pain relief through low-level laser therapy is not well understood. Research suggests Cytochrome c oxidase (Cox), the terminal complex in the electron transport chain, reacts with near-infrared photons. We are investigating the role of Cox using *Arabidopsis thaliana* wildtype and eight knockout lines missing specific Cox subunits. We isolated mitochondria and used a fiber-optic system to record oxygen consumption following ADP stimulation with and without 630nm HeNe laser irradiation. Our results indicate laser energy increases respiration in wildtype and the subunit 6B knockout line but does not increase respiration in knockout lines for subunits 1, 3, 10, 11, 15, 17, or 19. This suggests these 7 subunits may be involved in how laser energy enhances respiration. We are examining this further with cytochrome C oxidase assays of knockout lines in the presence and absence of laser irradiation.

**62. The effect of topiramate on drinking behavior and brain ethanol concentrations in a binge-like model of alcohol consumption**

C. Barrett Hawkins¹, William C. Griffin III², Marcelo F. Lopez², Howard L. Haun², Christina E. May², Lauryn Luderman² and Howard C. Becker²,³,⁴

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In this study, we investigate topiramate, or Topamax, as a possible method to curb abusive alcohol consumption. Aside from its role as an anticonvulsant, topiramate is known to reduce dopamine release in the mesolimbic pathway. Because of dopamine’s believed role in the rewarding effects of alcohol consumption, topiramate shows potential as a drug to reduce drinking. To measure ethanol intake, we employed a binge-like model of consumption where mice generally drink to a point of intoxication. We found that the administration of topiramate prior to a drinking session significantly reduced the consumption of ethanol compared to mice treated with saline (p<0.001). A neurochemical analysis of cerebrospinal fluid collected during microdialysis, also showed a decrease in the brain ethanol concentration of topiramate treated mice (p<0.001). Ultimately, topiramate may show promise as a pharmaceutical means of not only combating abusive behavior but also avoiding symptoms of withdrawal.

**63. If Hugo Hit Today**

Zak Bartholomew¹ and Caitlin Simmons²

¹Department of Anthropology and Sociology
²Department of Geology and Environmental Geosciences

This study investigates the physical and social impacts to South Carolina’s lowcountry Berkeley-Charleston-Dorchester region if a hurricane identical to Hugo were to make landfall today. In 1989, Hurricane Hugo Losses reached at least $5.9 billion in damages and there were thirty-five fatalities reported in South Carolina. This study employs Femar's HAZUS-2.1 (Hazards US) software package which uses ArcGIS 10.0 to model and calculate potential losses due to natural hazards. We investigated placing the historic HUGO storm onto today's infrastructure to better understand what a storm of its magnitude would do to the region today. Areas of focus included building and infrastructure damage, loss of emergency centers, and potential economic loss. If Hurricane Hugo struck today, damages are estimated
to be upwards of 7.1 billion dollars. HAZUS helps us to calculate the most at-risk areas and offers insight into future preparations for hazard mitigation.

64. The Galaxy Project: Bug Fixing and Feature Addition
Clayton Turner, Jacob Dierksheide, Jacob Song, and Albert Nardonne, Department of Computer Science

The Galaxy Project is an open-source, web-based platform for data-intensive bioinformatics analysis and research. Our team has contributed to this project and our contributions are available for public use. We handled the fixing of a bug that allowed metadata and comments in a tool that allowed for grouping to be performed on a dataset by a variable intrinsic within the same dataset. Additionally, we added a feature to Galaxy which allows tabular-delimited data to be transposed. Our implementation of the transposition takes advantage of the python garbage collector so datasets of any size can be used without having to worry about memory issues. These contributions can be utilized by anyone seeking to use Galaxy for their own projects and research, as well as anyone desiring to develop something novel to add to Galaxy.

65. Coastal Change on San Salvador Island, Bahamas: 1988-Present
Christina Hefron and James Carew, Department of Geology and Environmental Geosciences

In 1988, Daryl Clark completed a Masters thesis outlining the characteristics of modern beach sediment for 18 beaches on San Salvador Island, Bahamas. This study provides an assessment of 16 of the 18 beaches 25 years after Clark’s study. Samples collected from the lower beachface, upper beachface, backbeach, and dune environments were processed to determine particle size, grain texture, sample sorting, sample skewness, and kurtosis. The results of this study, and a smaller study completed by a College of Charleston student in 2010, were compared to Clark’s results to determine coastal changes on the island during the last quarter century. Clark concluded the major determinant of sediment texture and sorting on the island was offshore and coastal geomorphology. However, extreme energy events such as hurricanes and tropical storms, many of which have affected San Salvador in the past 25 years, also contribute to coastal change.

66. Contributing to Bootstrap’s Open Source Community
Brendan Keane, Andrew Armstrong, Crendall Kinard, and Will Franklin, Department of Computer Science

Bootstrap is an open-source framework utilizing JavaScript and CSS that aids in the development of web pages. Bootstrap has a large, active community on Github, with nearly 500 contributors and over 8900 commits. With a community this engaged, it was difficult to keep up with such a proactive and rapidly evolving development corps. We chose Bootstrap because it exposed us to a fast-paced mature software development community, and because we have all used bootstrap by some measure before. So far, we have made two significant bug fixes for Bootstrap. One is a code fix to streamline the automatic scrolling on a sidebar on Bootstrap’s website, and the other is a documentation fix to document Bootstrap Expo, a page, Bootstrap uses for examples.

67. Synthesis and Biological Evaluation of Chemotherapeutic Phthalazinone Analogs on Prostate Cancer
Brett Hoover, Brenna Norton-Baker, and Francis James Claire, Department of Chemistry and Biochemistry
Modern cancer chemotherapeutic treatments are cytotoxic to cancerous cells and healthy cells, causing dangerous side effects that lead to more harm than the cancer itself, thus more selective anti-cancer agents are needed. In collaborations with MUSC, we designed three compounds for targeted synthesis by designing and utilizing an activity relationship modeling technique based on combretastatin A-4 (CA-4) and 104 of its known synthesized derivatives. CA-4 is a chemotherapeutic drug used in late-stage thyroid cancer. It causes tumor cells to die by binding to tubulin, a protein involved in microtubule formation. Three compounds were predicted as active and synthesized. Through collaborations with MUSC, the compounds have been tested on prostate cancer cells and glioma cells. The results so far indicate that the drugs are active in inducing cell death at a level comparable to CA-4, but one especially has a significantly reduced toxicity to normally dividing cells.

68. Fixing Fennec and Extension Development
Tan Nguyen, Patrick Brewer, Ian Feeley, and David Bruneau, Department of Computer Science

Our team fixed a bug in the open source Firefox for Android project known as Fennec. In addition we developed an extension to improve user experience with the OAKS system that users can utilize in Firefox for desktop or Firefox for Android.

69. Contributing to an Open Source Interactive Development Environment
Tyrieke Morton, Lisa Smith, Cameron Spell and Jason Wilson, Department of Computer Science

Light Table is a new interactive development environment from programming in languages such as JavaScript, ClojureScript, and Python. Our team’s mission was to contribute to the functionality and overall user experience of the Light Table Project. To do so, we gained an understanding of the software, brainstormed, and finally, turned our ideas into a reality. Our contributions made Light Table’s install process easier, its interface more user friendly and extended it to support 2 more programming languages. Our impact has had a positive impact on the software’s community and has made Light Table more popular among programmers across the globe.

70. Fractal Dimension as a Means to Characterize Statistical Systems
Timothy B. Hayward and Michael L. Larsen, Department of Physics and Astronomy

The statistical approaches used to characterize discrete stochastic physical systems often rely on the properties of statistical stationarity (for a time series) or homogeneity (for a spatial point process). Separate methods are necessary for investigating nonstationary or inhomogenous data sets and the use of stationary tools with a non-stationary dataset, or vice versa, may lead to unphysical conclusions. Motivated by the data analyst’s need to determine what statistical tools are acceptable to use on non-stationary data sets, a number of fractal systems are investigated. A method is described for creating a colored noise signal and its fractal dimension as a function of sampling threshold is determined. The methods described for creating a data set with a predetermined fractal dimension can be used for investigating the statistical methods necessary for characterizing statistical systems.

71. Exoplanet and Circumstellar Disk Studies with the Hubble Space Telescope
Zachary Griggs and Brittany Yeager, Department of Physics and Astronomy

We present a status report on our efforts to develop computational tools to improve the effective sensitivity of Hubble Space Telescope (HST) imaging observations of circumstellar disks around nearby stars. Specifically, we are implementing and optimizing an algorithm, the Locally Optimized Combination of Images (LOCI), that enables one to combine tens or hundreds of digital images in a
manner that strips away the overwhelming light from the parent star, while leaving intact the faint light from the surrounding disk. The computational tools are being applied to data collected as part of the Hubble DICE survey (Disk Imaging, Characterization, and Exploration) of 11 nearby stars.

72. Firefox an Open Source Experience
Ashley Dix, Krista Grooms, Nadia Rodriguez, and Alex Schroeder, Department of Computer Science

Open source software development is quickly becoming one of the most preferred ways to develop software as it allows interested developers to contribute to the code base without them needing to be part of the original development team. Over the course of the past semester our team has been introducing ourselves into the Firefox open source development community. Contributing to the Firefox web browser has required us to join their development community by successfully submitting bug patches to their current release. As a team, we have learned the importance of communication not only among ourselves, but with other Firefox developers who have been able to guide and mentor us through our open source development experience. Through a team website we have cataloged many of our attempts both successful and unsuccessful to join the Firefox open source community which can be used as lessons learned when trying to join future projects.

73. The Future of Cyber Security
Krista Grooms, Department of Computer Science

President Obama has declared that the “cyber threat is one of the most serious economic and national security challenges we face as a nation”. Worldwide, cyber-attacks happen almost constantly. The targets of these attacks include not only individuals but larger organizations and even countries. I believe by understanding current risks, predicting future risks, and putting safeguards in place we may be able to diminish cyber security threats in the future. It is important that we not only teach these strategies to adults, but also to children as they are more accepting of technology which leaves them vulnerable to cyber-attacks. Furthermore, it is a necessity that we begin teaching these techniques to current computer science students who will be able to integrate what they have learned into their future computer programs; in turn leading to the replacement of risky code with programs that can battle cyber-attacks.

74. Spring Emergence Study at Field Site
Jordan Townsley, Austin Fitzhenry and Ben Sagara, Department of Biology

In decades to come, anthropogenic climate change will be a crucial selection pressure on the flora and fauna of the biomes. Our study records the emergence of insect pollinators during the spring of 2014, using flight intercept traps to discover temporal and spatial activity. An unusually cold winter meant a later than expected commencement of activity. We captured no bees, as very few flowers bloomed at the study site. This and the bias of our sample toward female flies may point to the study site being a spring nesting area as opposed to a spring feeding area. Further, flies were found only in the trap on the highest ground, the area most suitable for nesting. The species found, as well as their abundance and date of emergence, create an informative historical registry in the face of changing times.

75. Developing an Automated Processing Pipeline for Proprietary Rain Measurement Equipment
Joshua B. Teves and Michael L. Larsen, Department of Physics and Astronomy
In a newly constructed rain measurement array, 21 instruments with proprietary data formats were used to collect rain drop size distributions. The data was transmitted on a minutely basis, with full reports consisting of approximately one week of transmitted data. In order to effectively use the data, an automated pipeline was developed to both process the reports for the instruments and to organize the data into a system more suitable for analysis, as well as to handle erroneous data transmission. These techniques, their development and implementation, and performance will be summarized.

76. - Award of Merit - Evaluation of Computationally Designed Enzymes by Comparison with Model Systems
Joshua Schmidt, Kate Diedrich, and Marcello Forconi, Department of Chemistry and Biochemistry

De-novo design by computation represents an exciting new avenue in enzymology, with potential to advance bioremediation of pollutants and synthesis of drugs. Current designed enzymes achieve rate acceleration with hydrophobic substrates three orders of magnitude less than natural enzymes. To provide a benchmark for the role of non-specific interactions, we have studied the retroaldol reaction of methodol in the presence of micelles and long-chain amines. We found that the combination of cetyltrimethylammonium chloride (CTAC) and dodecylamine enhances this second order rate constant by four orders of magnitude. The same rate enhancement was observed with bovine serum albumin and with cellular retinoic acid binding protein II. In addition, micelles of CTAC, in combination with a long-chain phosphate or carboxylate, accelerate the Kemp elimination of 4-nitrobenzisoxazole by four orders of magnitude. For these two reactions, our findings suggest that the computational design did not capture common motifs of enzymatic catalysis.

77. Modeling Subsidence of Olympus Mons Using Lava Flows as Paleo-slope Indicators
Mariel Simpson, Ashleigh Reeves, John Chadwick and Patrick McGovern, Department of Geology and Environmental Geosciences

Olympus Mons is an enormous volcano on Mars (600 km wide and 22 km tall) that would be expected to subside into the crust, yet there is little indication of such subsidence on the surface. In this study, we mapped the orientations of lava flows on the plains to the southeast of Olympus Mons using imagery from the Thermal Emission Imaging System (THEMIS) on Mars Odyssey, and topography using Mars Orbiter Laser Altimeter (MOLA) data from Mars Global Surveyor. The results indicated that the lava flows deviate from modern slope vectors (i.e., downhill) in a counterclockwise direction by 21.4 ± 10.8 degrees (n = 65)—consistent with recently occurring subsidence centered on the volcano. Geophysical modeling estimates the lithospheric subsidence of about 1.2 km due to the magmatic addition of 3.8x10^5 km^3. Crater counts of the area constrained the date of the subsidence to the past 229 ± 26 my.

78. Fiber Optic Reflectance Oxygen Monitoring During Surgery
Elizabeth Works, Janet McKim and Linda Jones, Department of Biology

The pulse-oximeters at the Pet Helpers Greer Spay and Neuter Clinic frequently malfunction during surgery causing situations in which the animal’s safety is compromised. The research conducted was to determine if fiber optic reflectance would provide a non-invasive accurate method of determining an animal’s blood oxygen level during surgery. The results of the fiber optic reflectance method were initially compared to the readings of the pulse-oximeters to ensure the accuracy of the readings. It was determined that the fiber optic method accurately provided real-time visual indicators of oxygenation levels during surgery without the malfunctions associated with the current pulse-oximeters.
79. Mathematics in Ancient African and Middle Eastern Cultures
Alexx Niblock, Department of Mathematics

The importance of mathematics as a building block of society is irrefutable. Mathematics is a necessary component of business, architecture, technology and essentially everyday life. When it comes to ancient African and Middle Eastern cultures, western education in the area of mathematics often neglects the important contributions of Ancient African and Middle Eastern Cultures. The lack of information circulating in regard to the roles of these civilizations in the development of mathematics as a discipline affects perception both educationally and socially.

80. Groundwater Response to Evapotranspiration in a Forested Wetland: Congaree National Park, South Carolina
Clay M. Dustin\textsuperscript{1,3}, Austin E. Morrison\textsuperscript{2}, Timothy J. Callahan\textsuperscript{2,3}
\textsuperscript{1}Dept of Mathematics
\textsuperscript{2}Graduate Program in Environmental Studies
\textsuperscript{3}Dept of Geology and Environmental Geoscience

We inspected groundwater level data to estimate gross evapotranspiration (ET) in a floodplain forest. Groundwater level data were collected hourly at ten different wells from 2009 to 2013. Wells were screened 4-7 m deep in the surficial aquifer and arrayed from the floodplain bluff along a 3-km, valley-perpendicular transect to Cedar Creek, a local tributary of the Congaree River. Time series analysis of diurnal ET signals in the groundwater level data was used to functionally group well locations with similar characteristics. Data on soils and forest community structure are currently being collected and analyzed to identify relationships between soil drainage, vegetation community, and groundwater dynamics. This project stemmed from hydrology class trips to Congaree National Park sponsored by the park’s education and outreach program. Students learned field methods and data collection, management, and analysis techniques to reinforce hydrology concepts and principles.

81. Evidence of Anthropogenic Contamination in Shem Creek, SC
Katie Kerns, Sonja Tyson, Kyle Schultz, Kelsey Murdough, Barbara Beckingham, and Vijay Vulava, Department of Geology and Environmental Geosciences

Shem creek is vital to the shrimp and tourist industries in Charleston, SC, making it highly susceptible to anthropogenic sources of contamination. Waterfront restaurants allow patrons to pull boats directly to their establishments. This combined with industrial shrimping traffic and boat storage are potential sources of polycyclic aromatic hydrocarbon (PAH) contamination in sediments and specific biota. The purpose of this investigation is to identify PAH contamination in the water column. PAH, pH, conductivity, total suspended solids, dissolved oxygen, and redox potential were measured to investigate contamination levels at three sites within Shem Creek. A Gas chromatography–mass spectrometry was used to analyze sixteen volatile varieties of PAH including: d-NAP, ACE, PHE, Chrys, and Pery. The results of the study are currently being processed.

82. Troponin T Isoforms and Flight performance in Honey Bees
Douglas Jansen and Agnes Southgate, Department of Biology

The troponin complex (Tn) is composed of TnC, Tn I, and TnT, and by binding calcium regulates muscle contractions. TnT binds tropomyosin and inhibits actin-myosin interactions. Isoforms of TnT are thought to affect calcium sensitivity of the troponin complex and may contribute to asynchronous contractions.
in insect indirect flight muscles (IFMs). Quantitative differences between TnT isoforms in IFMs would support this hypothesis. Honey bees (Apis melifera) were collected as either foraging bees (high level of flight) or nurse bees, and RNA was extracted from dissected IFMs. RT-PCR was used to determine the presence, absence, and relative amount of alternative exons 10A and 10B, as well as the NH2 terminal exons 2-5. The 10A isoform is expected to be more prevalent than 10B in the IFMs, and to increase with the foraging behavior. Furthermore, differences in the N terminus of isoforms are expected to vary between nurses and foragers.

83. Diverging Ridge Features on the Juan de Fuca and Gorda Ridges
Mary Eaton, Monica Steele and Leslie Sautter, Department Geology and Environmental Geosciences

Geomorphological features of the Juan de Fuca and Gorda Ridges, and the Blanco and Mendocino Fracture Zones were observed, to relate them to the seismic activity associated with the diverging plate boundaries of the Northeast Pacific Ocean. These ridges and fracture zones comprise the divergent plate boundary of the eastern edge of the Pacific Plate and the western edges of the Juan de Fuca and Gorda Plates. Both of these eastern plates are being subducted beneath the western edge of the North American Plate. Fault and ridge orientations are used to compare the direction of seafloor spreading, and indicate that both the Juan de Fuca Plate and Gorda Plate are spreading in a southeastern direction. Younger ridges from the Gorda Ridge system mapped in the study run parallel to the boundary; however older ridges do not show the same orientation, indicating a change in spreading direction.

84. Effects of an Artificial Oyster Reef on the Surrounding Ecosystem near McClellanville, SC
Sonja Tyson and Scott Harris, Department of Geology and Environmental Geosciences

Artificial Crassostrea virginica reefs are installed to restore habitats, protect against erosion, and for economic reasons. This study quantifies change surrounding an artificial reef installation, including shoreline migration, sediment changes, and oyster growth near McClellanville, SC. Surveys collected sediment samples, digital photographs, and laser scans of the reef and surrounding area. Data from the laser scanner was post-processed using Cyclone 8.1 to generate 3-D point clouds. High-resolution images were combined in AGIsoft photo modeling software and sediment samples were analyzed using a Cilas particle size analyzer. The data shows a decrease in grain size on the landward side of the oyster reef. The increased deposition of sediment did not provide a discernible change to the shoreline. However, an increase in Spartina alternifora stalks in the marsh directly behind the reef indicate that lateral marsh growth is initiating. Oysters did not distribute evenly across the reef, but prospered in different areas.

85. Susceptibility of Candida species to complement-derived antifungal peptides
Mary Alice Cummings¹,², Silvia Vaena de Avalos², David Schofield³ and Caroline Westwater²,³
¹College of Charleston
²Department of Oral Health Sciences, Medical University of South Carolina
³Department of Microbiology and Immunology, Medical University of South Carolina

Candida species are the most common fungal pathogen of humans. Infections range from non-life threatening mucocutaneous disorders to life-threatening invasive disease that can involve any organ. Given the substantial mortality rates associated with invasive candidiasis, appropriate antifungal treatment is crucial. Candida infections are commonly treated with either azoles or non-azole antifungal agents; however, the emergence of resistance among Candida albicans isolates is limiting treatment
options. Our laboratory has recently discovered that complement-derived peptides have potent antifungal activity against a range of Candida species. The goal of this study was to test the ability of complement-derived peptides to exert antifungal activity against a panel of C. albicans strains with resistant to one or more antifungal agent. Our preliminary data supports the further evaluation of complement-derived peptides as a therapeutic approach for the treatment of fungal infections.

86. Alternative Splicing & Z-Band Protein Isoforms in Manduca sexta
Diana Fulmer and Agnes Ayme-Southgate, Department of Biology

Alternate splicing offers the cell a convenient way to make multiple protein isoforms from a single gene. This in particular allows for the creation of slightly different myofibrillar proteins in different muscle types and different lifecycles. It is important to understand these different splicing patterns and the amino acids they encode in multiple species to better comprehend the conservation of functional domains in these proteins and how they have evolved through time. My project was focused on a better understanding of the proteins implicated in the sarcomere Z band from the Carolina sphinx moth Manduca sexta. I retrieved and annotated several splicing variants of the Z-band proteins α-actinin, ZASP52, as well as the splicing factor Muscleblind (Msb), which is involved in the alternate splicing of the previous two proteins. The data will be discussed in light of the differences in physiology between Manduca sexta and our reference system Drosophila melanogaster.

87. Mutational Position Effects of Allelic T-DNA insertions on Root Variation in Arabidopsis Thaliana
Amber Frazier and Courtney J. Murren, Department of Biology

Insertional mutagenesis is a method of disrupting gene function through the insertion of foreign DNA into a gene of interest. In the model plant Arabidopsis thaliana, insertional mutagenesis through transfer-DNA (T-DNA) insertions is a powerful tool to link genes to phenotypes. Our current study aims to elucidate the effects of mutation position on plant phenotype by comparing the phenotypic expressions of single T-DNA insertions in the promoter region and exon region of the same genes. We identified a set of root specific genes and a set of ‘background’ genes for which a T-DNA line was available in both the promoter and exon and grew the plants in common garden. Phenotyping of belowground traits and aboveground traits for this set of lines is ongoing. We expect insertions in exons to differ from insertions in promoter regions by showing greater divergence from natural accessions than insertions in the promoter region.

88. Synthesis of Alkyl Epsilon-Caprolactone Derivatives
Christina Crossley and Brooke A. Van Horn, Department of Chemistry and Biochemistry

Specific epsilon–caprolactone synthesis is of paramount importance in the growing need to develop biodegradable imaging molecules for in vivo imaging. For this project, the synthesis of 6-methyl-epsilon-caprolactone from 2-methylcyclohexanone was performed via a Baeyer-Villiger Oxidation. This reaction ultimately inserts oxygen to the most substituted position of the carbonyl (in this case the methylated position). The resulting cyclic esters (lactones) will serve as specifically substituted monomers, which can then be copolymerized into molecules containing specific reactive groups. This presentation will elaborate on synthesis of these molecules as well as an overall analysis and characterization of these lactones by nuclear magnetic resonance (NMR). We will also outline and discuss our future plans to use these molecules in co-polymerization reactions (with commercially available caprolactone) by means of an organic catalyst.
89. - Award of Merit - Degradable X-ray Imaging Polymers  
Samantha E. Nicolau, Lundy L. Davis, Caroline C. Duncan and Brooke A. Van Horn, Department of Chemistry and Biochemistry  

X-ray imaging is a common technique used in medical science in which contrast agents injected in the body are illuminated to detect and diagnose disease states. Our lab aims to guide X-ray imaging science away from the current limitations associated with small molecule contrast agents and toward polymer systems. Polymeric systems have the benefit of being tunable in size, biodegradable, and variable in the contrast agent content on the polymer chains. We have (1) synthesized a single iodine-containing hydroxylamine to attach to poly(epsilon-caprolactone) polymers, (2) successfully grafted it to polymers, and (3) performed a synthesis of a new triiodo derivative for which a single graft experiment has been attempted. This poster presentation will highlight the specifics of our small molecule and polymer syntheses as well as their characterization with NMR spectroscopy and size exclusion chromatography. It will also showcase recent X-ray imaging evaluations acquired through collaboration with Clemson University.

90. Sorption Behavior of Pharmaceutical and Personal Care Products in Natural Soils  
Kat Johnson, Department of Geology and Environmental Geosciences  

Pharmaceutical and personal care products (PPCPs) are an increasing concern for hydrologic and terrestrial environments. There are thousands of PPCPs manufactured and consumed globally; due to improper waste treatment/disposal, these chemicals are frequently released into natural environments. The long term effects of these chemicals are not fully understood but the physiological effects of these chemicals presents a health risk for many organisms. The purpose of this study was to examine how two common PPCPs—naproxen and cetirizine—interact with soils and to determine how they might react in natural environments. Chromatography principles were used to study the reaction of these chemicals in soils that have varying levels of clay and organic matter (OM). It was determined that naproxen adsorbs more strongly to OM-rich soils and cetirizine to clay-rich soils. Understanding how these PPCPs react with soils can be used to mitigate adverse effects in natural environments.

91. Novel Synthetic P3HT Block Copolymers  
Dillon G. Presto, David S. Boucher, and Brooke A. Van Horn, Department of Chemistry and Biochemistry  

Abstract: In the search for more efficient solar cells, polymer-based photovoltaic materials have attracted a significant amount of attention. The efficiency of conversion of light to solar energy is largely dependent on the thin-film morphology of photoactive species. The use of organic photovoltaic materials therefore has significant potential in the field of solar energy as their morphology can be manipulated, whereas common inorganic solar materials cannot. Poly(3-hexylthiophene) (P3HT) is a photoactive polymer that has been under the scrutiny of much research due to its electronic and photonic properties. Electron acceptor systems such as quantum dots and fullerenes can be utilized in conjunction with P3HT to promote charge percolation in solar cells. Unfortunately, in common organic solvents P3HT and electron acceptors exhibit phase separation, significantly decreasing the efficiency of charge percolation. Our research focuses on the synthesis of diblock copolymers that will circumvent this problem. We seek to couple polymers such as polystyrene and polyvinylpyridine which have an affinity for quantum dots with P3HT in hopes of generating a system that is optimal for energy production in solar panels.

92. Cysteine Modification via Nucleophilic Aromatic Substitution
Jessica Kapp and Marcello Forconi, Department of Chemistry and Biochemistry

Literature reports suggest that hexafluorobenzonitrile selectively reacts with cysteine to produce a single product, with a fluorine atom on the ring being replaced by cysteine residue. Substitution of cysteine with benzoinitrires will provide a simple method to introduce nitrile groups into proteins for IR analysis. Multiple fluoroarboenonitrile rings were tested with cysteine against other amino acids in order to determine the selectivity of the of the aryl compounds. We found that 3,4,5-fluorobenzonitrile selectively reacts with cysteine to produce the para product and an elimination byproduct. Production of the byproduct was reduced by over 50% when the reaction was run under nitrogen and when water was used as the solvent. Further trials will test peptide chains and proteins containing cysteine with this aryl ring.

93. Effect of stimulus direction on electroretinogram recordings from three cockroach species
Edward S. Johnson and Jeffrey D. Triblehorn, Department of Biology, Program in Neuroscience

Electroretinograms (ERGs), a minimally invasive extracellular recording technique, record the summed electrical activity of photoreceptor cells. We investigated the effects of stimulus direction on the ERG in three cockroach (Blattaria) species: *Periplaneta americana*, *Blaberus craniifer*, and *Gromphadorhina portentosa*. Tungsten electrodes recorded ERG responses to a white LED light stimulus presented at eight different intensities from three directions (front, 90° side, and rear; one direction tested per animal). ERGs were signal averaged from 30 presentations per intensity to generate Stimulus-Response (S-R) curves normalized to the largest ERG amplitude. *P. americana* had similar S-R curves to light from all directions. *B. craniifer* and *G. portentosa* S-R curves were shifted to the left for the side and rear, indicating greater sensitivity to light at these directions. *G. portentosa* and *B. craniifer* were more sensitive to light from the front and side. All species exhibited similar S-R curves to light from the rear.

94. Neurocircuitry Underlying Resistance to Punishment
Dominika Pullmann¹, Peter Vento² and Thomas Jhou²
¹Department of Psychology and Program in Neuroscience
²Department of Neurosciences, Medical University of South Carolina

The rostromedial tegmental nucleus (RMTg) and the lateral habenula (LHb) have been shown to activate in response to aversive stimuli. There is a large degree of variation in tolerance to these stimuli (e.g., footshock) between individuals indicating that there may be variability in the neurocircuitry involving the LHb and the RMTg in punishment resistance. The present study examines the underlying differences that contribute to this individual variation. Rats were trained to lever press for food reward, and then received daily sessions in which response to the lever was punished by variable intensity footshock until an intolerable intensity was reached. Thus we quantified activation within the LHb and the RMTg using immunohistochemistry in response to this behavioral paradigm. Ablations to the RMTg have been shown to raise the tolerance to shock, and thus, we hypothesize that individual variation in the sensitivity of the neurocircuitry influences resistance to punishment.

95. The Myoproteome of *Manduca sexta*: Gene Annotation and Transcript Analysis
Agnes Southgate and Sam Feldman, Department of Biology

Insects have been classified based on the physiology of the thoracic flight muscles as either synchronous or asynchronous. Insects with asynchronous muscles, such as *Drosophila melanogaster*, have myofibrillar protein isoforms that are only found in indirect flight muscles. The current hypothesis states
that these specific isoforms are unique to asynchronous flight muscles. *Manduca sexta* (Carolina sphinx moth) has synchronous flight muscles, and it was therefore hypothesized that *Manduca sexta* would have no flight muscle-specific protein isoforms. Analysis through the use of bioinformatics, gene sequencing, and transcript evaluation has provided insight on an array of different proteins such as actin, troponin C, and kettin/sallimus. The characterization of these proteins has indicated that specific isoforms do exist in *Manduca sexta* flight muscle, for example troponin C has 2 flight isoforms and kettin/sallimus contains extended PEVK domains. The data lead us to an alternate explanation for the difference in the synchronous/asynchronous flight systems.

96. Shoal Attachment on the Northeast End of Dewees Island, SC
Seema Shah and Leslie Sautter, Department of Geology and Environmental Geosciences

Dewees Island, South Carolina is classified as a prograding barrier island, however in the last 8 years the island has undergone significant erosion. College of Charleston's Project Oceanica has been conducting a study of Dewees' shoreline since 2006 and has monitored the landward migration of an offshore, large sand shoal that detached from Capers Inlet. Prior to shoal attachment, between 2004 and 2013, the shoreline in the area near to the shoal eroded 15m in the north, the center eroded 56m, and the south area accreted 13m. Beach surveys conducted in March 2014 in the same area show the shoal's migration and attachment onto the shoreline, resulting in a widened and elevated berm. We predict that the shoal sands will be distributed by longshore currents to the central and southern portions of the island, causing accretion of the shoreline downdrift.

97. Geomorphology of Submarine Canyons and Related Slope Features along the Eastern New England Continental Margin, USA
Isadora Kratchman, Seema Shah, and Leslie Sautter, Department of Geology and Environmental Geosciences

Multibeam sonar data of submarine canyons and slump features was analyzed along a 390 km segment of the Eastern New England continental margin. Submarine canyons are erosional features located on continental margins that transport sediments from shelf regions to the deep ocean. Major slumping along the margin can alter seafloor morphology and has the ability to generate dangerous tsunamis. In the study area, eight incised canyons and numerous slope canyons were identified, from Veach Canyon to Munson Canyon. Incised canyons were classified based on canyon length, relief, sinuosity, and general morphology. In between incised canyons, the study area displays a transition between areas of dominant slumping features to areas dominated by slope canyons. All incised canyons narrowed in width as depth increased. However, Hydrographer and Lydonia Canyons had the highest degrees of sinuosity, and canyon width increased before ultimately narrowing as depth increased.

98. The Homebrew Package Manager
Dirk Gadsden, Drew Rodman, Cassio Greco and Jake Wisse, Department of Computer Science

Homebrew is an Open Source package manager for Mac OS X similar to Ubuntu’s Advanced Packaging Tool that can be used to ease the process of installing libraries, programming languages, and applications. Contributors define their own Formulas that users can run with Homebrew to automate compilation, setup, and installation of software across various environments in order to remove as much manual configuration as possible. At this point in time the project is approaching version 1.0 and evolving very quickly as issues are addressed and features are added by its supporting community.
an Open Source application, developers are encouraged to get involved in its contribution workflow in order to resolve issues and add functionality.

99. The Application of Dasymmetric Resampling of Census data to the South Carolina Berkeley-Charleston-Dorchester region
Nicholas Capps¹ and Christina Carmack²
¹Department of Geology and Environmental Geosciences
²Department of Computer Science

Analyzing population data over several decades can prove difficult due to poor precision in older data sets. Normalizing data sets through the dasymmetric resampling provides an avenue for the analysis of data, despite the disparities in precision. Dasymmetric resampling is a method of subdividing spatial information from larger regions into smaller regions using heuristic and proportional methods. By employing a dasymmetric resampling algorithm, we are able to take extremely coarse track data and view trends that would only be accessible in higher resolution Census block data. Using this method we are able to map the urban growth in the BCD area from 1980 to 2010. The visual displays developed in ArcGIS show general growth in the region, as well as pockets of slow and accelerated growth. Data from this resampling technique can be used to better understand the Lowcountry region and help planners and managers better support the community.

100. Bathymetric Comparison of Submerged Headland Features of the US South Atlantic Bight
Hunter J. Miles and Leslie R. Sautter, Department of Geology and Environmental Geosciences

The geomorphology of three offshore submerged headlands was examined using multibeam sonar. These headlands occur along the north-south trending South Atlantic Bight (SAB) continental shelf edge, approximately 100 km east of the South Carolina and North Carolina coasts. The Gulf Stream runs northward along the SAB’s shelf edge before deflecting eastward into the open ocean near Cape Hatteras. The three sites compared are Bull Scarp, in the southern-most location, Cape Fear Terrace, and the northern-most Cape Lookout Terrace. Depths of these features range from approximately 40 to 235 m. Multiple bathymetric features were analyzed, compared, and contrasted to characterize the seafloor along this dynamic continental shelf edge. Features include escarpments, sand waves and rocky reefs. Characterizing and describing these seafloor areas will allow for improved understanding of the relationship between seafloor geomorphology and the Gulf Stream, as well as their roles in providing flourishing fish habitats.

101. Phenotypic effects of different mutation types in GLABRA1 in Arabidopsis thaliana
Alexander DePue and Matt Rutter, Department of Biology

Mutation of GLABRA1 (GL1) in the model organism Arabidopsis thaliana is known to result in reduced presence of epidermal trichome cells – small defensive “hairs” that aid in herbivory resistance. GL1 encodes a MYB-related transcription factor that is first in a cascade of cofactors that regulate trichome production. Phenotypic trichome data were recorded for five GL1 alleles including spontaneous, X-Ray, and tDNA knockout mutants. It was found that trichome densities were highly variable and dependent on the nature and location of the mutation. Additional analyses examining fitness costs of trichome production showed that there was no significant relationship between trichome density and fruit number.
102. **Award of Merit - The Control of Ethanol-Seeking Behavior Directed by the Lateral Hypothalamic Orexin Neurons**

Elisabeth Kilroy\(^1\), David Moorman\(^1\) and Gary Aston-Jones\(^2\)

\(^1\)Department of Exercise Science and Program in Neuroscience
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The lateral hypothalamus (LH) is a targeted region in the reward circuitry that plays an important role in motivation and reward. In the rat model, the activation of localized orexin neurons in the LH following alcohol consumption triggers the subsequent release of dopamine from the ventral tegmental area. This further excites the mesolimbic dopamine system, the most prominent of the natural reward circuits. As a proposed mechanism for reducing ethanol self-administration and reinstatement of ethanol-seeking behavior, we administered an orexin-1 receptor antagonist, SB-334867 (SB). Rats were trained to self-administer ethanol on a fixed-ratio 3 schedule. Our results demonstrate that SB significantly decreased ethanol consumption as a measure of active lever presses (ALP) and well entries (WE) during the conditioning phase and during cued-reinstatement. Further, a significantly greater effect of SB on reducing ALP and WE during self-administration and cued-reinstatement was found in rats with a greater preference for ethanol.

103. **Potential Evidence for Coal Ash Contamination in the Lower Saluda River**

Larissa Almeida, Taylor Intaphan, Megan Jackson, Kori Ktona, Alex Porter and Nicholas Roach, Department of Geology and Environmental Geosciences

A coal-fired power plant, McMeekin Station sits at the source of the Lower Saluda River, which later flows through the major population center of Columbia, South Carolina. Coal ash, a Hazardous byproduct of coal burning, is known to be stored in ponds on site at McMeekin. The objective was to analyze surface water near McMeekin to determine if coal ash from the plant has contributed to contamination of the local watershed. Surface water samples were taken both upstream and downstream of the power station. Based on previous studies reporting groundwater contamination from coal ash storage at the site, we expect that geochemical analysis of water downstream of McMeekin Station will find elevated levels of analytes such as chromium, iron, lead, mercury, and sulfate. While sulfate levels did not show a difference, measurements of metals by ICP-MS are pending.

104. **Working with Django**

Lynn Kitchner, Chris Moore, Bobby Jenkins, and Johanna Wiel, Department of Computer Science

For our computer science capstone class, we were tasked with contributing to an open source software project. We chose Django because of our previous experience with the Python programming language and our enthusiasm for web development. Django is an open source framework that uses Python to connect a database and a set of server side functions to a front end website. Our team has become part of the Django community, learning about the inner workings of bug tickets, triaging, and communication with other developers. While contributing to Django, we became familiar with tools such as GitHub, Sphinx, and Trac. Throughout the project, we maintained a team Wikispace and individual professional blogs to document our progress. The experience we have gained during this process will be valuable as we begin our careers as software engineers.

105. **Analysis of Dramatic Shoreline Changes on Dewees Island, SC**

Isadora Kratchman and Leslie Sautter, Department of Geology and Environmental Geosciences
Changes in beach morphology of Dewees Island, SC were analyzed by students and faculty from the College of Charleston’s Project Oceanica program with support from the Dewees Island Conservancy. Five surveys of the beach were conducted between 2010 and 2014 along twenty transect lines. Data from these surveys and aerial photographs were used to quantify and determine the cause of changes in beach morphology. Since 2010 the southwestern portion of the island has eroded approximately 1 m in elevation, the central portion has experienced both accretion and erosion, and the northeastern portion has accreted in elevation and dramatically lengthened seaward. The chief contributor to the island’s shoreline changes is shoal bypassing at the northeastern end, influenced by the direction of Capers Inlet. Monitoring of the beach provides insight into processes that control beach morphology and island stability, and assists with developing future management plans.

106. Searching for extrasolar planets with the Subaru SEEDS survey
Kellen Lawson, Joe Carson, and the SEEDS Science Team, Department of Physics and Astronomy

Strategic Explorations of Exoplanets and Disks with Subaru (SEEDS) is an international astronomical survey that uses observations with the Subaru Telescope to directly image extrasolar planets and disks in order to better understand their nature and evolution. As a part of this survey, we use the Angular Differential Imaging (ADI) technique, which utilizes the symmetrical nature of a star throughout a set of rotated images in order to isolate asymmetries such as planets. Additionally, we make use of the Locally Optimized Combination of Images (LOCI) algorithm, which combines a large number of images to effectively strip away starlight while leaving the faint planetary light intact. Once a planet is confirmed, additional observations can allow direct imaging to reap information such as planet temperature and composition. This information aids in filling a gap in the census of exoplanets, and will help to reach a more complete understanding of their nature.

107. Development of a Reflectivity Based Storm Simulator
Joerael C. Harris and Michael L. Larsen, Department of Physics and Astronomy

It was hypothesized that RADAR returns could be utilized to develop a tool to simulate and infer properties of storms. To test this hypothesis, an evolutionary model of RADAR reflectivity change was constructed. In an effort to characterize this model, simulated storms were compared to an ensemble of real storms from 2008-2013. The model was able to realistically create individual storm time series of reflectivity, but was unable to reliably model peak storm intensity or storm duration.

108. - Award of Merit - The Effects of Fingolimod Administration in a Genetic Model of Cognitive Deficits
Darius D. Becker-Krail and Antonieta Lavin
1Department of Biology and Program in Neuroscience at the College of Charleston
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Several studies link schizophrenia related deficits in cognition with diminished expression of the dysbindin-1 protein. We have previously shown that lacking dysbindin-1 reduces glutamate release in the prefrontal cortex (PFC) through decreased expression of L- and N-type Ca2+ channels. Fingolimod (Gilenya ®) is known to increase endogenous brain derived neurotrophic factor (BDNF) levels, and in turn, BDNF is known to increase N-type Ca2+ channels. We investigate fingolimod’s effects on cognitive deficits in a dysbindin-1 null mutant mouse. Three genotypes of male mice (WT, HET, MUT) were divided into two treatment groups, saline or fingolimod, and tested for both social interaction (SI) and working memory (WM). We then assayed [BDNF]pfc and intracellular [Ca2+]pfc across both groups. Fingolimod
treated MUT mice show increased SI, improved WM, higher [BDNF]pfc, and increased presynaptic [Ca2+]pfc. These results show promise for counteracting schizophrenia associated cognitive deficits, and may illuminate the possible role of dysbindin-1 in symptom pathogenesis.

Helen Olmi, Department of Biology

The efficacy of two equine worming systems was tested. One group of equines was de-wormed every third month with moxidectin, an equine anthelmintic. The other group of equines was de-wormed, with moxidectin, only when necessary as indicated by their fecal egg count. Fecal egg count tests were performed on each equine every three weeks to document the efficacy of each method. Results indicated that the two methods are equally effective in keeping equine’s fecal egg counts at a safe and healthy level. This indicates that the antiquated method of worming every third month may be effectively replaced by the fecal egg count based method in order to reduce and prevent parasite resistance to equine anthelmintics.

110. Drupal Development Project
James Roth, Nelson Hazelbaker, Alex Wang and Cristovam Segundo, Department of Computer Science

Drupal is a free software package that allows you to easily organize, manage and publish your content, with an endless variety of customizations. It’s built, used, and supported by an active and diverse community of people around the world. The project is open source which makes it free to use by everyone. Drupal implements modularity and extensibility, which is one of the reasons why Drupal is so popular, with a multitude of free modules and extensions. Another governance of Drupal is their effort to have quality coding. Drupal is standards-based, meaning that it supports established and emerging standards. Drupal is also dedicated to having low resource demands on their system. They attempt to provide excellent performance by putting a premium on low-profile coding. Drupal aims to have an ease of use for their users. Drupal governs on collaboration, supporting open, collaborative information sharing systems and approaches.

111. Geomorphology of Submarine Canyons and Related Slope Features along the Western New England Margin, USA
Sonja Tyson, Kristine Rollings, and Leslie Sautter, Department of Geology and Environmental Geosciences

Submarine canyons are erosional features located on continental margins, acting as conduits for sediment transport from coastal and shelf regions to deep oceans. However, submarine canyons have an array of morphologies and these differences change erosional and depositional processes, and sediment distributions. Major slumping along the margin can alter morphology and generate tsunamis, potentially threatening nearby coastal communities. Two main types of submarine canyons exist along the New England margin from Middle Toms Canyon to Atlantis Canyon: 1) incised canyons, which originate on the continental shelf; and 2) slope canyons that initiate on the margin’s slope. Multibeam sonar data collected were used to develop a canyon classification system, based on canyon length, relief, sinuosity, margin gradient, and general morphology. Based on observations, slumping is highly associated with margin gradient and canyon type. Slumping is found in canyons along a steep margin gradient and between canyons on gradual margins.
112. A Bathymetric Analysis Comparing the Geomorphology of Two U.S New England Seamounts
Caitlyn Coker Mayer and Leslie Sautter, Department of Geology and Environmental Geosciences

An east-west trending seamount chain occurs off the New England coast in the western Atlantic Ocean. This chain of submarine volcanoes ranges in age from 80 to 103 million years old, formed when the North American Plate began to diverge from the Mid-Atlantic Ridge, moving westward over the Great Meteor hotspot. The two largest seamounts, Kelvin and Atlantis II Seamounts, were characterized using multibeam sonar, and seamount volumes and vertical reliefs were calculated. Volumes of 3291 and 3037 km$^3$, and vertical reliefs of 3422 and 3277 m for Kelvin and Atlantis II Seamounts, respectively suggest that both seamounts formed over the same length of time. Gradient, alignment, and age similarities indicate that the seamounts formed by the same method, presumably by eruptions from a hotspot.

113. Relationship of Submarine Canyon Morphology and Tsunami Propagation for the Northeast Pacific Continental Margin
Brendan Guthrie, Skyler Hurley, Matt Platt and Leslie Sautter, Department of Geology and Environmental Geosciences

Multibeam sonar data for four submarine canyons from the Washington (US) and Vancouver (Canada) continental margin were used to examine the effect of tsunami propagation. Depths from canyon cross-section profiles were used to calculate wave amplitude and wave celerity for a potential tsunami. The seafloor flanking the canyons show increase in tsunami wave amplitude in comparison to amplitude along the canyon axes. Canyon flanks also show decrease in wave celerity in comparison to celerity at canyon axes. Observations show correlation with prior studies confirming that the presence of a submarine canyon prevents an increase in wave amplitude along the canyon axis and increases tsunami arrival time to the shore relative to non-canyon areas.

114. The Mississippi Margin: A Comparison of Continental Margin Geomorphologic Features
Nicholas C. Damm, Robert W. Rivers and Leslie R. Sautter, Department of Geology and Environmental Geosciences

The Mississippi Margin is located on the continental shelf and slope off the Mississippi and Louisiana coasts in the Gulf of Mexico. The two sites for this study consist of a deltaic region located 45 km south of the Mississippi Main Pass and a non-deltaic region located 160 km south of Atchafalaya Bay. The study area located south of the Mississippi Main Pass has a gradual slope, contains various erosional features, and salt domes. The study area south of the Atchafalaya Bay includes a large salt dome with various slump deposits and evidence of turbidity currents. Salt dome dimensions, relief, and gradient were unaffected by their location along the margin. However, continental margin relief and gradient in areas where salt domes are not present is much greater in deltaic-regions versus non-deltaic regions, likely due to influx of terrestrial sediments from the Mississippi River into the deltaic region.

115. The Biological Mechanisms of Cocaine-Seeking
Kristina Bruce, Sarah Barry, and Jacqueline McGinty, Department of Psychology, Program in Neurosciences and Department of Neurosciences, Medical University of South Carolina

The relapse behavior associated with drug addiction is one of the most difficult aspects of the addiction cycle to treat, thus making it our target. The dorsomedial prefrontal cortex (dmPFC) plays a critical role in the reinstatement of cocaine-seeking. Following forced abstinence, brain-derived neurotrophic factor
APPENDIX F: STUDENT RESEARCH ABSTRACTS

(BDNF), when infused into the dmPFC, has been shown to attenuate drug-seeking. The goal of this study is to use a SFK inhibitor to determine if SFKs are necessary for BDNF’s attenuation of cocaine-seeking and normalization of ERK deactivation following cocaine self-administration. In this experiment, a SFK inhibitor, PP2, and its inactive isomer, PP3, were infused into the dmPFC prior to BDNF in order to test whether SFK inhibition blocks BDNF’s effects on cocaine-seeking as well as ERK phosphorylation. An understanding of the mechanisms underlying BDNF’s ability to attenuate drug reinstatement could lead to advancements in the prevention of relapse in a reinstatement paradigm.

Kristine Rollings and Tim Callahan, Department of Geology and Environmental Geosciences

Dixie Plantation is a historic property in Meggett, SC owned by the College of Charleston Foundation. The plantation holds much value to the college for education and research purposes. Groundwater wells and a weather station have been operating at the site for the past 10 years; this study makes use of two wells recently installed by Dr. Callahan’s hydrology students and the weather data to calculate a water budget for a spring-fed freshwater reservoir. The project goal is to predict the amount of water in the reservoir. This study is an example of providing science data to support management decisions. In this case, wildlife make use of the freshwater ponds at the site. We will explain the hydrogeologic characteristics of the site to help inform planning and management decisions at similar locations.

117. Spectral, Theoretical, and SEM Studies of Chitosan-Ag Films
Sean Flanagan1, Narayanan Kuthirummal1, and Nicole Levi-Polyachenko2
1Department of Physics and Astronomy
2Wake Forest University

In our previous study the vibrational spectra of pure chitosan films were compared to a set of films containing 10 ppm, 500 ppm, and 2000 ppm silver nanoparticles. The studies showed that there was no detectable interaction in either the Infrared or UV-Vis spectra, which implied that if there was an interaction, it was a weak one. In the current study, we built a model of the chitosan-Ag system using the biomolecular modeling program Abalone. This theoretical model along with Scanning Electron Microscope (SEM) images were used to verify that the interaction between chitosan and silver nanoparticles is dominated by Van Der Waals forces. The SEM images also showed that there was no ordered structure to the system, with silver nanoparticles randomly dispersed within the chitosan matrix.

118. Urbach Tail Studies of Argon-doped Zinc Oxide Nanostructures
Shea McSween, Narayanan Kuthirummal, Marco A. Rodriguez-Cote, Ramakrishna Podila and Apparao Rao, Department of Physics and Astronomy

Photoacoustic spectroscopy in the visible and infrared was used to analyze the contribution of defect levels on the absorption behavior of pure zinc oxide as well as ZnO samples irradiated with Argon for lengths of 30, 60, and 90 minutes. Regions of the visible absorption spectra were fitted to Urbach energy models allowing the band gap energy Eg and onset energy to be determined. Eg increased with increasing defect levels from 3.549 eV, 3.595 eV, 3.663 eV and finally 3.729 eV, while the optical onset energy decreased with values of 2.868 eV, 2.827 eV, 2.812 eV and 2.827 eV. The Urbach energy parameter, which describes the width of the exponential absorption edge, decreased from 0.122, 0.102, 0.097 and increasing to 0.101 revealing increased density of defect states. Scanning electron microscopy
was additionally performed to obtain the surface morphology of the bulk ZnO and of the nanostructures.

119. The Effects of Stimulated Activity on Zebrafish Circadian Rhythms
Jessica A. Dugan1,2,3 and Mark W. Hurd1,2,4

1Department of Psychology
2Program in Neuroscience
3Honors College, College of Charleston
4Department of Neurosciences, Medical University of South Carolina

Circadian rhythms are behavioral and physiological patterns that cycle daily and synchronize to environmental stimuli. Zebrafish are a useful model for studying vertebrate circadian rhythms due to their diurnal pattern of activity. It was recently shown that forced exercise in the late afternoon improves rhythm robustness in adult mice. We sought to test similar manipulations on zebrafish circadian period. Adult zebrafish maintained on a 14:10 light:dark (LD) cycle were transferred to either constant dark (DD) or constant light (LL) conditions; animals were allowed to acclimate for 24 hours. Individual locomotor activity was then recorded for three days to establish a baseline using the EthoVision 7 system. On day 4, activity was stimulated for 30 minutes. Activity was tracked for six days following stimulation. Analyses indicated a significantly longer period in DD following stimulation (t=2.06, p<.04). Manipulations like these in humans could serve as a potential remedy for common sleep problems.

120. Biological effects of ibuprofen and its photodegradant on southern toad tadpoles (Anaxyrus terrestris)
Jonathan Brown, Jessica Ramirez, Wendy Cory and Allison Welch, Department of Biology

Ibuprofen is one of the most commonly used pharmaceuticals today and exists in appreciable concentrations in environmental wastewater. Ibuprofen also photodegrades into different metabolites that may confer human toxicity under conditions of significant exposure. Therefore the purpose of our research was to ascertain if photodegradation-derived metabolites were more toxic than their parent compounds. We measured LC50 of each parent compound and metabolites using tadpoles of Anaxyrus terrestris, and observed that ibuprofen metabolite(s) were more toxic than the parent compound. Future research will include testing mixtures of parent compounds in metabolites to ascertain if mixtures are more toxic than single compounds alone. Previous studies suggest that combinations of these drugs or more deleterious to aquatic organisms than single-drug exposures. Data from our studies will inform future investigations to study the significance of pharmaceuticals in environmental waters and these findings may assist efforts to protect animal and human health.

121. Triboelectric Power Generation
Luther Meyer and Alem Teklu, Department of Physics and Astronomy

Triboelectric generators for energy harvesting and production purposes have been optimized within the last two years to the point that relatively small ones are now capable of supplying the power necessary to charge batteries and power small electronics. The generators rely on two triboelectric matericals (Teflon and Nylon for this experiment) from opposite sides of the triboelectric series being in frictional contact such as pressing or sliding. The friction induces an electrical gradient and with the presence of electrodes on either side of the materials, the electrons flow through an external circuit. We classified the triboelectric series based upon physical and chemical structure in order to make the material
selection process less cumbersome for different applications. We then built a triboelectric generator and characterized the mechanism of electron flow and current dependence.