Academic Affairs

School of Sciences and Mathematics

Program Improvement Summary

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 projects (198 in FY 13 and 234 in FY 14). Many quality proposals are declined due to lack of funding through the CoC 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.

Click for complete assessment report

Biology

Biology - BA

Program Improvement Summary

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.
Biology - BS

Program Improvement Summary

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

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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.

Marine Biology - BS

Program Improvement Summary

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

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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.

Marine Biology - MS

Program Improvement Summary

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 an 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.
Chemistry - BA

Program Improvement Summary

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.

Chemistry - BS

Program Improvement Summary

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. 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.

Chemistry - Minor

Program Improvement Summary

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.
Computer Science

Computational Thinking - Minor

Program Improvement Summary

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

The BS Computer Science program is accredited by ABET (Accreditation Board for Engineering and Technology). The Computational Thinking minor overlaps significantly with the BS Computer Science program and therefore inherits similar assessment quality measures. For the Computational Thinking minor, we assessed the same three program goals.

The Computational Thinking minor is in place to allow students an exposure to computer science. Students with this minor are required to take at most 9 credit hours in a set of CSCI 100 level courses that includes: CSCI 112, CSCI 114, CSCI 120, CSCI 180, and CSCI 199. Students are also required to take at least 9 credit hours that are CSCI 200 or above. The above map identifies the most common courses students take to earn this minor.

Our results were positive in all three areas for our freshman students. Because the faculty member tasked with assessing our middle year students failed to question those students we have no data for the middle years. Overall we were disappointed with the responses given by our senior computer science majors in all three areas. This group averaged only 66.67% over all three program goals which fell short of our anticipated result of 90% accuracy.

The Computer Science department intends to use a direct measure method in the form of a course embedded assessment in exams, where most appropriate and likely to effectively assess a particular outcome. Assessment will likely be in a subset of these courses: CSCI 120, CSCI 220 and CSCI 230.

Computer Information Sciences - MS

Program Improvement Summary

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.

Computer Information Systems - BS/Minor

Program Improvement Summary

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

BS Computer Information Systems

The BS Computer Science program is accredited by ABET (Accreditation Board for Engineering and Technology). The BS Computer Information Systems overlaps significantly with the BS Computer Science program and therefore inherits similar assessment quality measures. For the BS Computer Information Systems, we assessed the same three program goals.

Our results were positive in all three areas for our freshman students. Because the faculty member tasked with assessing our middle year students failed to question those students we have no data for the middle years. Overall we were disappointed with the responses given by our senior computer science majors in all three areas. This group averaged only 66.67% over all three program goals which
fell short of our anticipated result of 90% accuracy.

The BS Computer Information Systems degree requirements changed this academic year. However we assessed based on the old requirements. The Computer Science department intends to use a direct measure method in the form of a course embedded assessment in exams, where most appropriate and likely to effectively assess a particular outcome. Assessment will likely be in a subset of these courses: CSCI 215, CSCI 315 and CSCI 459.

The number of majors in the BS CIS program has doubled this year from last year, which was an outcome of the curriculum update for this program.

Computer Science - BA

Program Improvement Summary

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

BS/BA Computer Science

The BS Computer Science program is accredited by ABET (Accreditation Board for Engineering and Technology). The BA Computer Science program is a proper subset of the BS program. For the BS/BA in Computer Science programs, we assessed three program goals.

Our results were positive in all three areas for our freshman students. Because the faculty member tasked with assessing our middle year students failed to question those students we have no data for the middle years. Overall we were disappointed with the responses given by our senior computer science majors in all three areas. This group averaged only 66.67% over all three program goals which fell short of our anticipated result of 90% accuracy.

At the August 2014 meeting of the computer science faculty, the results of the survey will be discussed. At that time, we will decide how to proceed in order to reach the 90% goal hoped for by our seniors. Further, the importance of asking for student feedback will be reiterated so that middle year students along with freshman and seniors will be questioned. The plan is to discuss the results and decide if the low performance was caused by poor questions, untimely delivery of the questions, or a true weakness in the students completing the degree. It is our belief that factors outside of students’ capabilities may have been a factor and that the results seen this year can be improved greatly with more understanding of the process by our faculty. The results from the prior year were significantly higher using the same assessment process.

The number of graduates from the computer science continues to rise and our alumni can find both jobs and high salaries in the tech industries.

Computer Science - BS

Program Improvement Summary

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

BS/BA Computer Science

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The number of graduates from the computer science continues to rise and our alumni can find both jobs and high salaries in the tech industries.

**Computer Science - Minor**

**Program Improvement Summary**

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

**Computer Science minor**

The BS Computer Science program is accredited by ABET (Accreditation Board for Engineering and Technology). The Computer Science minor is a proper subset of the BS program. For the Computer Science minor, we assessed three program goals.

Our results were positive in all three areas for our freshman students. Because the faculty member tasked with assessing our middle year students failed to question those students we have no data for the middle years. Overall we were disappointed with the responses given by our senior computer science majors in all three areas. This group averaged only 66.67% over all three program goals which fell short of our anticipated result of 90% accuracy.

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The number of graduates from the computer science continues to rise and our alumni can find both jobs and high salaries in the tech industries.

**Computing in the Arts - BA**

**Program Improvement Summary**

*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.

Data Science - BS/Minor

Program Improvement Summary

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.

Geology and Environmental Geosciences

Geology - BA

Program Improvement Summary

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 it curriculum and teaching methods. We have engaged our students in review 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 in 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.

Geology - BS

Program Improvement Summary

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 it curriculum and teaching methods. We have engaged our students in review 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 in 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.
Mathematics

Mathematics - BA

Program Improvement Summary

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.

Mathematics - BS

Program Improvement Summary

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.

Mathematics - Minor

Program Improvement Summary

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 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.

Mathematics - MS

Program Improvement Summary

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.

Operations Research - Certificate

Program Improvement Summary

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.
**Statistics - PBCert**

**Program Improvement Summary**

*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.

**Physics and Astronomy**

**Program Improvement Summary**

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

The assessment process in the Department of Physics and Astronomy benefited from more widespread interest and involvement this year. As a result, the student learning objectives were improved to be more useful and interesting to faculty members. The Meteorology Curriculum committee found that developing assessment criteria helped them to better define the courses within that new program.

For the most part, the assessment instrument itself has been improved and we expect to have some meaningful data in the next cycle. The assessment design was completed late in the year, so some items like the standardized testing were not implemented in time. It was difficult to motivate students to take a voluntary Major Field Test even with incentives. We will be more prepared for the 2014-2015 process and look forward to having evaluable results. Meanwhile, a few patterns have begun to emerge to indicate areas that need improvement.

Interestingly, several different programs have shown similar overall weaknesses in skills that we assumed to be mastered at the introductory level. Understanding of units and dimensional analysis, relativistic motion and basic force concepts are some of the areas that need more attention throughout the minors and majors. Beginning in Fall 2014 the assessment committee will facilitate communication among instructors of the relevant courses to exchange ideas about in-class problem solving, learning and retention of these basic concepts and skills.

Preliminary results of writing assessments suggest that it would be helpful for the department to develop a checklist for the capstone paper. In addition, it would be useful to list some writing standards for various types of reports, perhaps to be included in the student handbook. The assessment committee will see that this task is initiated early in the year and that the results are incorporated in rubrics that can be used in Spring classes and in the assessment process.

No budget changes are anticipated.

**Astronomy - BA/Minor**

**Program Improvement Summary**

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

SLO 4: Since only 1 student this year completed the Astronomy Minor and 0 completed the Astronomy BA, it was impossible to extract meaningful statistics on Astronomy Knowledge. The single student who was assessed scored slightly below the proficiency level, with the most glaring deficiencies being orbital mechanics and astronomical distance scales. It is recommended that these results be combined with future assessments in order to gather more robust statistics.

SLO 5: Due to the limited number of students in the Astro Minor and Astro BA who took writing-assessable courses within the last year, only three Astro Minor students and zero Astro BA students were assessed. Thus, it was not possible to extract meaningful statistics. The three students that were assessed all met or exceeded expectations for effective communication in written works involving scientific concepts. It is recommended that these results be combined with future assessments in order to gather more robust statistics.

**Astrophysics - BS**

**Program Improvement Summary**

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

**Student Learning Objectives:**

1. Students design and carry out an experiment to solve an astrophysics-related problem.

2. Students apply classical and relativistic motion principles correctly in astrophysics problems.
3. Students are able to answer questions on the level of the Physics subject test on the Graduate Record Exam.

**Assessment Results:**

**SLO 1:** Only 2 students were assessed on this SLO, so we do not have robust statistics. Nevertheless, based on the limited results, it appears Astrophysics BS students are exceeding the expectations. The student who was downgraded for not collecting her/his own data, was, in fact, carrying out research in a manner consistent with the more theoretical aim of his research project. Since the department has already decided that theoretical modeling is a worthy topic for a capstone research project, it would seem that either the assessment rubric for this SLO needs to be modified, or else a different course should be used to evaluate this SLO. This issue will be considered by the Astronomy Curriculum Committee this year.

**SLO 2:** At its core, the question used for assessing this SLO this year was testing whether students understand 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 have not mastered 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. The department will recommend that:

1. PHYS 111/112 teachers put greater emphasis on unit balance and unit conversion.
2. the ASTR 231 (Introduction to Astrophysics) instructor review basic unit balance and unit conversion.

**SLO 3:** Only 3 students took the subject level test, so no useful statistical results came out of this. We have to find a better way to assess this SLO in the future. Clearly a volunteer test at the end of the year (even with incentives) is not going to provide useful data. The department will consider whether to make this test part of a required course or make it its own degree requirement.

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**Biomedical Physics - Minor**

**Program Improvement Summary**

**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 field. 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.

Meteorology - Minor

Program Improvement Summary

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

There were no students completing the program this year so a formal assessment was not possible. However, the process of writing the student learning outcomes led to the following conclusion. 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.

Physics - BA/Minor

Program Improvement Summary

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.

Physics - BS

Program Improvement Summary

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

School of Sciences and Mathematics

Program Name: School of Sciences and Mathematics
Program Type: Academic Affairs
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)
Program follows specialized accreditation standards: Yes
Name of accrediting organization: NA
Date of last program review for the accrediting organization: NA
Date of next program review: NA

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


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>
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<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>
<td>70</td>
</tr>
<tr>
<td>CSCI</td>
<td>6</td>
<td>10</td>
<td>16</td>
<td>10</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>GEOL</td>
<td>1</td>
<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

2013 2014
# Posters  107 121
# Students 210 237

Summer Research
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
- Spring_2014_Students_Who_Took_Research_Courses

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</th>
<th>Students</th>
<th>% by</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL</td>
<td>23</td>
<td>39.1%</td>
<td>BIOL</td>
</tr>
<tr>
<td>CHEM</td>
<td>14</td>
<td>57.1%</td>
<td>CHEM</td>
</tr>
<tr>
<td>GEO</td>
<td>9</td>
<td>75.0%</td>
<td>GEO</td>
</tr>
<tr>
<td>HONS</td>
<td>5</td>
<td>100.0%</td>
<td>HONS</td>
</tr>
<tr>
<td>MATH</td>
<td>36</td>
<td>47.4%</td>
<td>MATH</td>
</tr>
<tr>
<td>PHYS</td>
<td>17</td>
<td>100.0%</td>
<td>PHYS</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>57.1%</td>
<td>Total</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.

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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.

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**Program Improvement Summary**

**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 projects (198 in FY 13 and 234 in FY 14). Many quality proposals are declined due to lack of funding through the CoC 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.