School of Sciences and Mathematics

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

Outcome 1 Assessing high impact course offerings is a new outcome. 2017-18 was used to set the baseline for future data collection. Previously we have assessed only undergraduate research. We have now added other courses such as internship and field courses.

Outcome 2 With budget cuts this year it was not possible to reach our targets in assessing our ability to use roster faculty in General Education courses.

Outcome 3 Pre-Professional students in the health sciences continue to have impressive acceptance rates. We will further enhance our efforts in order to increase the number of acceptances.

Outcome 4 With the re-opening of the Rita Hollings Science Center we hope to improve our outreach offerings.

Outcome 5 With the re-opening of the Rita Hollings Science Center we hope to improve our research efforts in PHYS/ASTR and BIOL.

Biology - BA/Minor

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

For the BA in Biology, with the exception of student assessment of rigor (Outcome 2, Measure 2), we failed to meet any of our Core Concepts and Competencies targets for either the Foundation Sequence (Outcome 1) or Programmatic Improvement (Outcome 2).

Moreover, for Programmatic Improvement (Outcome 2, Measure 1), we saw MFT scores lower among graduating BA Biology majors than in the BIOL 211 cohort. These results are similar to 2016-2017, and stand in stark contrast to 2015-2016, when all targets were met for these outcomes. For Science Communication (Outcome 3), we also failed to meet our target for Measure 2, but met our target for Measure 1.

With only 3 years of data (some of which based on limited sample sizes), it is difficult to ascertain whether the current failure to meet these targets reflects a real trend or stochastic variation, particularly with the low sample sizes for graduating seniors (see below). In addition, this past year corresponds to the Biology Department's downtown faculty facing uncertainty as to the timing of the move back into RITA and in some cases, a loss of research space for some part of the year, all of which may have had unanticipated consequences. Thus, no curricular changes are planned at this time. A secure website accessible to all roster faculty in the Biology Department has been established to house assessment results, to allow for more informed discussions of possible revisions to the BA curriculum over the coming years.

The implementation of Outcome 2, Measure 1 (percentile increase in overall MFT scores between the end of the Foundation Sequence and graduation) continues to be problematic: as the BA in Biology does not have a capstone course, there is no “captive audience” from which we can obtain a random sample of graduating seniors. Strategies for obtaining a larger random sample of BA Biology graduating seniors in 2018-2019 are currently being developed.

To provide better continuity between years, the Associate Chair now performs all assessment duties (prior to 2017-2018, these duties were distributed across the Assessment Committee, whose membership changed each year).

Biology - BS

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

For the BS in Biology, we failed to meet any of our Core Concepts and Competencies targets for either the Foundation Sequence (Outcome 1) or Programmatic Improvement (Outcome 2). These results are similar to 2016-2017, but stand in stark contrast to 2015-2016, when nearly all targets were met for these outcomes. For Science Communication (Outcome 3), we also failed to meet our target for Measure 2, but met our target for Measure 1.

With only 3 years of data (some of which based on limited sample sizes), it is not possible to determine whether the current failure to meet these targets reflects a trend or stochastic variation. In addition, this past year corresponds to the Biology Department's downtown faculty facing uncertainty as to the timing of the move back into RITA and in some cases, a loss of research space for some
part of the year, all of which may have had unanticipated consequences. Thus, no curricular changes are planned at this time. A secure website accessible to all roster faculty in the Biology Department has been established to house assessment results, to allow for more informed discussions of possible revisions to the BS curriculum over the coming years.

The implementation of Outcome 2, Measure 1 (percentile increase in overall MFT scores between the end of the Foundation Sequence and graduation) continues to be problematic: as the BS in Biology does not have a capstone course, there is no “captive audience” from which we can obtain a random sample of graduating seniors. Strategies for obtaining a larger random sample of BS Biology graduating seniors in 2018-2019 are currently being developed.

To provide better continuity between years, the Associate Chair performs all assessment duties (prior to 2017-2018, these duties were distributed across the Assessment Committee, whose membership changed each year).

**Marine Biology - BS**

**Assessment Report Summary**

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

For the BS in Marine Biology, we failed to meet any of our Core Concepts and Competencies targets for either the Foundation Sequence (Outcome 1) or Programmatic Improvement (Outcome 2). As the results for Outcome 2 were based on only 2-3 graduating seniors, their interpretation is highly suspect. For Science Communication (Outcome 3), we also failed to meet our target for Measure 2, but met our target for Measure 1.

With only 3 years of data including only a total of 10 students, it is not possible to determine whether the current failure to meet these targets reflects a trend or stochastic variation; thus, no curricular changes are planned until additional data can be collected. A secure website accessible to all roster faculty in the Biology Department has been established to house assessment results, to allow for more informed discussions of possible revisions to the BS Marine Biology curriculum over the coming years.

The implementation of both measures for Outcome 2 (Programmatic Improvement) continues to be problematic: as the BS in Marine Biology does not have a capstone course, there is no “captive audience” from which we can obtain a random sample of graduating seniors for either the MFT or the supplementary exam. Strategies for obtaining a larger random sample of BS Marine Biology graduating seniors in 2018-2019 are currently being developed.

To provide better continuity between years, the Associate Chair performs all assessment duties (prior to 2017-2018, these duties were distributed across the Assessment Committee, whose membership changed each year).

**Center for Coastal Environmental and Human Health**

**Assessment Report Summary**

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

This is the first year of data collection and a baseline was being set.

**Biochemistry - BS**

**Assessment Report Summary**

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

1) **Mandatory Advising:** The Department has been discussing for multiple years (as evidenced in retreat meeting minutes) how to recruit and retain majors. We have also been evaluating senior survey comments for many years where we ask specifically about advising. These surveys routinely indicated that our majors were not taking advantage of advising within the department and a non-trivial number of the surveys lamented the lack of advising. This year, we decided to require mandatory advising for all majors and students were required to see their advisor before registration for Spring 2018 and Fall 2018 courses. Faculty note the following: 1) it has been easier to redirect students who are struggling to maintain a 2.0 GPA in the major

2) it has been easier to discuss research opportunities with students

3) it gives faculty opportunities to convince majors to stick with the program instead of changing to an easier major.

2) **Bioanalytical chemistry:** The addition of Bioanalytical Chemistry was a change that took several years of reflection and then action to develop. The Department discussed early in 2012 the state of instrumentation in the department and did a thorough inventory of what skills were being developed in each course. A glaring problem that emerged from that analysis was that biochemistry students were not getting as thorough an introduction to instrumentation as the chemistry majors were, primarily because most of the instrumentation usage was taking place in Instrumental Analysis and Advanced Synthesis, both courses that biochemistry majors do not take. When we revised our curriculum in 2013, we included both of these courses as options for biochemistry students to pick up their required number of lab hours for ACS certification. We designed the curriculum with an eye toward a future course that might be required of all biochemistry majors where they were introduced to instruments used more routinely in biochemistry labs, in particular mass spec and NMR. When we had a faculty positions available, we sought out persons who could contribute to the development of such a course. Mike Giuliano and Jay Fornythe were hired in part because of their ability to expand our curriculum in this area. After they had a chance to acclimate to the department and to plan together the structure of the new course, we were finally able to offer the course in Spring 2018. The course will likely be added to the options of lab courses this year and we may decide to make it a required course for the major.
3) **Course Preparation Modules**: Over the course of several years, we have gradually implemented online reviews prior to the beginning of courses. We started with Chem 111, then added Chem 112, then added optional Chem 231 and Chem 232. This past year, organic review was mandatory (i.e., part of the course grade). We have also switched the general chemistry system to an intelligent learning system that quizzes students on material they are prepared for and reviews it until the system is confident of mastery of the topic.

4) **Organic Improvements**: Over the course of several years, we discussed the flaws in the SI program that were not serving the organic chemistry sequence well. Instead of participating in the SI program, we hired peer mentors from within the department (primarily) who did not need to attend the class or education courses—this freed up time for our best and very busy students to participate. Last year we supplemented external problem solving sessions with an optional practicum session. These are active learning sessions with the faculty member. Most sections are reporting almost a full grade difference between those that take the practicum and those that don’t.

5) **Physical Chemistry Improvements**: Roughly five years ago, the department began discussions with the Math Department to implement a new math course, Math 229, tailored to the math needs of chemistry students in physical chemistry. The course combined elements of Calculus II, Calculus III, linear algebra and differential equations. While other factors affect student grades in this course, generally speaking the students seem to be performing slightly better in the course with the improved math preparation. In addition, comments on senior surveys bemoaning the poor math skills have all but disappeared from senior surveys; before the change complaints about math were quite common.

6) **Research Improvements**: The Department’s Research Rotation for majors arose out of discussions during faculty annual retreats about how beneficial undergraduate research is for students (see for example the MFT results above). The rotation was intended to give young majors a way to connect to research professors and other students so that they had the confidence to seek out a summer experience in the lab.

Mandatory Academic Advising was implemented in part to allow faculty-student conversations to occur about the importance of research. There continues to be a tension between the College wanting to boast about faculty doing research with students without the College adequately supporting the endeavor—URCA needs a better budget and faculty efforts need to be recognized in the tenure and promotion process.

**Chemistry - BA/Minor**

Assessment Report Summary

7. **Summary of Assessment Results with Focus on Program Improvement**: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

Biochemistry

1) **Mandatory Advising**: The Department has been discussing for multiple years (as evidenced in retreat meeting minutes) how to recruit and retain majors. We have also been evaluating senior survey comments for many years where we ask specifically about advising. These surveys routinely indicated that our majors were not taking advantage of advising with in the department and a non-trivial number of the surveys lamented the lack of advising. This year, we decided to require mandatory advising for all majors and students were required to see their advisor before registration for Spring 2018 and Fall 2018 courses. Faculty note the following: 1) it has been easier to redirect students who are struggling to maintain a 2.0 GPA in the major

2) it has been easier to discuss research opportunities with students

3) it gives faculty opportunities to convince majors to stick with the program instead of changing to an easier major.

2) **Bioanalytical chemistry**: The addition of Bioanalytical Chemistry was a change that took several years of reflection and then action to develop. The Department discussed early in 2012 the state of instrumentation in the department and did a thorough inventory of what skills were being developed in each course. A glaring problem that emerged from that analysis was that biochemistry students were not getting as thorough an introduction to instrumentation as the chemistry majors were, primarily because most of the instrumentation usage was taking place in Instrumental Analysis and Advanced Synthesis, both courses that biochemistry majors do not take. When we revised our curriculum in 2013, we included both of these courses as options for biochemistry students to pick up their required number of lab hours for ACS certification. We designed the curriculum with an eye towards a future course that might be required of all biochemistry majors where they were introduced to instruments used more routinely in biochemistry labs, in particular mass spec and NMR. When we had a faculty positions available, we sought out persons who could contribute to the development of such a course. Mike Giuliano and Jay Forsythe were hired in part because of their ability to expand our curriculum in this area. After they had a chance to acclimate to the department and to plan together the structure of the new course, we were finally able to offer the course in Spring 2018. The course will likely be added to the options of lab courses this year and we may decide to make it a required course for the major.

3) **Course Preparation Modules**: Over the course of several years, we have gradually implemented online reviews prior to the beginning of courses. We started with Chem 111, then added Chem 112, then added optional Chem 231 and Chem 232. This past year, organic review was mandatory (i.e., part of the course grade). We have also switched the general chemistry system to an intelligent learning system that quizzes students on material they are prepared for and reviews it until the system is confident of mastery of the topic.

4) **Organic Improvements**: Over the course of several years, we discussed the flaws in the SI program that were not serving the organic chemistry sequence well. Instead of participating in the SI program, we hired peer mentors from within the department (primarily) who did not need to attend the class or education courses—this freed up time for our best and very busy students to participate. Last year we supplemented external problem solving sessions with an optional practicum session. These are active learning sessions with the faculty member. Most sections are reporting almost a full grade difference between those that take the practicum and those that don’t.
5) Physical Chemistry Improvements: Roughly five years ago, the department began discussions with the Math Department to implement a new math course, Math 229, tailored to the math needs of chemistry students in physical chemistry. The course combined elements of Calc II, Calc III, linear algebra and differential equations. While other factors affect student grades in this course, generally speaking the students seem to be performing slightly better in the course with the improved math preparation. In addition, comments on senior surveys bemoaning the poor math skills have all but disappeared from senior surveys; before the change complaints about math were quite common.

6) Research Improvements: The Department’s Research Rotation for majors arose out of discussions during faculty annual retreats about how beneficial undergraduate research is for students (see for example the MFT results above). The rotation was intended to give young majors a way to connect to research professors and other students so that they had the confidence to seek out a summer experience in the lab. Mandatory Academic Advising was implemented in part to allow faculty-student conversations to occur about the importance of research. There continues to be a tension between the College wanting to boast about faculty doing research with students without the College adequately supporting the endeavor—URCA needs a better budget and faculty efforts need to be recognized in the tenure and promotion process.

Chemistry - BS
Assessment Report Summary
7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

1) Mandatory Advising: The Department has been discussing for multiple years (as evidenced in retreat meeting minutes) how to recruit and retain majors. We have also been evaluating senior survey comments for many years where we ask specifically about advising. These surveys routinely indicated that our majors were not taking advantage of advising within the department and a non-trivial number of the surveys lamented the lack of advising. This year, we decided to require mandatory advising for all majors and students were required to see their advisor before registration for Spring 2018 and Fall 2018 courses. Faculty note the following: 1) it has been easier to redirect students who are struggling to maintain a 2.0 GPA in the major

2) it has been easier to discuss research opportunities with students

3) it gives faculty opportunities to convince majors to stick with the program instead of changing to an easier major.

2) Biomedical chemistry: The addition of Biomedical Chemistry was a change that took several years of reflection and then action to develop. The Department discussed early in 2012 the state of instrumentation in the department and did a thorough inventory of what skills were being developed in each course. A glaring problem that emerged from that analysis was that biochemistry students were not getting as thorough an introduction to instrumentation as the chemistry majors were, primarily because most of the instrumentation usage was taking place in Instrumental Analysis and Advanced Synthesis, both courses that biochemistry majors do not take. When we revised our curriculum in 2013, we included both of these courses as options for biochemistry students to pick up their required number of lab hours for ACS certification. We designed the curriculum with an eye towards a future course that might be required of all biochemistry majors where they were introduced to instruments used more routinely in biochemistry labs, in particular mass spec and NMR. When we had a faculty positions available, we sought out persons who could contribute to the development of such a course. Mike Giuliano and Jay Fosythe were hired in part because of their ability to expand our curriculum in this area. After they had a chance to acclimate to the department and to plan together the structure of the new course, we were finally able to offer the course in Spring 2018. The course will likely be added to the options of lab courses this year and we may decide to make it a required course for the major.

3) Course Preparation Modules: Over the course of several years, we have gradually implemented online reviews prior to the beginning of courses. We started with Chem 111, then added Chem 112, then added optional Chem 231 and Chem 232. This part year, organic review was mandatory (i.e. part of the course grade). We have also switched the general chemistry system to an intelligent learning system that quizzes students on material they are prepared for and reviews it until the system is confident of mastery of the topic.

4) Organic Improvements: Over the course of several years, we discussed the flaws in the SI program that were not serving the organic chemistry sequence well. Instead of participating in the SI program, we hired peer mentors from within the department (primarily) who did not need to attend the class or education courses—this freed up time for our best and very busy students to participate. Last year we supplemented external problem solving sessions with an optional practicum session. These are active learning sessions with the faculty member. Most sections are reporting almost a full grade difference between those that take the practicum and those that don’t.

5) Physical Chemistry Improvements: Roughly five years ago, the department began discussions with the Math Department to implement a new math course, Math 229, tailored to the math needs of chemistry students in physical chemistry. The course combined elements of Calc II, Calc III, linear algebra and differential equations. While other factors affect student grades in this course, generally speaking the students seem to be performing slightly better in the course with the improved math preparation. In addition, comments on senior surveys bemoaning the poor math skills have all but disappeared from senior surveys; before the change complaints about math were quite common.

6) Research Improvements: The Department’s Research Rotation for majors arose out of discussions during faculty annual retreats about how beneficial undergraduate research is for students (see for example the MFT results above). The rotation was intended to give young majors a way to connect to research professors and other students so that they had the confidence to seek out a summer experience in the lab. Mandatory Academic Advising was implemented in part to allow faculty-student conversations to occur about the importance of research. There continues to be a tension between the College wanting to boast about faculty doing research with students without the College adequately supporting the endeavor—URCA needs a better budget and faculty efforts need to be recognized in the tenure and promotion process.
Computational Thinking - Minor

New Assessment Report Summary Item

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

The program is being closed.

Computer Information Systems - BS/Minor

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

Student performance in SLO a and b were measured across several semester in courses CSCI 220 and 392 to determine if there have been any reduction in learning due to curricular and delivery changes to the courses. The results show that the changes did not negatively impact the SLOs and therefore this shows that no roll-back of the changes are needed.

Student performance in SLO c was high in both CSCI 392 and CSCI 462, showing that our students are performing well on the delivery aspect of management information systems.

Computer Science - BA

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

There are three issues that occurred in 2017-18 assessment compared to previous assessment cycles:

1. Due to changes the the ABET-Computing Accreditation Commission's changes in its Criteria for accrediting computer science programs, the number of outcomes to be considered dropped from 11 to 6. The department adopted these outcomes as its own and from now on will assess all of them over a two-year cycle (three in year one and three in year two) rather than a three year cycle. The 2017-18 cycle represents the first assessment with the new outcomes and was done in preparation for our ABET visit in September 2018.

2. The department has been using a graduate TA for one of its Programming I laboratories (CSCI220L) and has collected data on student performance in this course with the TA to see if there is a difference in student performance.

3. Beginning in 2015, the department changed the prerequisites for CSCI 352 (Software Engineering) to include CSCI 230 (Data Structures). The 2017-18 cycle provided the first time to assess the impact of this change.

Results The following are the student outcomes assessed in 2017-18

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.

2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline.

3. Communicate effectively in a variety of professional contexts.

SLO 1 and SLO 2: With regard to the first two Student Learning Outcomes, student performance was measured in CSCI 220/220L (where these two learning outcomes are first introduced) and CSCI 362.

In CSCI 220, Student performance on these SLO was measured by the Final Exam in the course. All questions on the exam is related to this SLO. The average student performance scores on the Final Exam were (the target performance is a score of 70%):

Spring 2016: 74%
Fall 2016: 73%
Spring 2017: 74%
Fall 2017: 81%
No downward inflection point in student performance was observed in the Spring 2017 semester (when the TA started), and therefore these results provide some quantitative data that suggest the switch to a TA in the lab sections has not had a negative effect on students’ performance in SLO 1 or SLO 2.

In CSCI 362, the same instructor taught this course regularly both before and after the prerequisite change, which provided a stable instrument to evaluate this SLO across semesters. The performance on team programming projects in CSCI 362 which is directly related to this SLO was analyzed. The target is that student performance meet a satisfactory level of 80%. The recorded performance was:

- Fall 2013 – Section 1: 19/23 (82%), Section 2: 20/25 (80%)
- Fall 2014 – Section 1: 13/19 (68%), Section 2: 24/27 (89%)
- Fall 2015 – Section 1: 22/22 (100%), Section 2: 23/23 (100%)
- Fall 2016 – Section 1: 16/19 (84%), Section 2: 21/21 (100%)
- Fall 2017 – Section 1: 16/16 (100%), Section 2: 18/25 (72%)

Although the prerequisite change did not appear officially in the catalog until Fall 2016, students taking CSCI 362 in Fall 2015 were being advised that having CSCI 230 as a prerequisite is beneficial. The above data suggests that the added prerequisite does seem to have had a small improvement on the student’s performance on the programming project in CSCI 362, confirming that this was a good curricular improvement. Since Fall 2016, for example, a low performance of 68% has not been observed in any section of the course.

SLO 3: Communicate effectively in a variety of professional contexts.

With regard to the third Student Learning Outcome, student performances, student performance was measured in CSCI 392 and CSCI 462.

CSCI 392 Seminar on Computing and Society requires the students to deliver oral presentations and written papers. The course featured 13 research presentations by professors and professionals from various universities and companies and each student was asked to research either the ethical, legal, or social implications of a research speaker’s area, and present their findings to the class, for discussion and evaluation.

Student performance was evaluated by both the instructor and the student’s peers. Twenty (23) of 33 students achieved “excellent” performance, 8 students achieved “acceptable”, and 2 students achieved “unacceptable”. Most students achieved excellent or acceptable performance (31 of 33 students, 94%).

Although the target was met, in order to improve performance, in the future, the instructor suggested spending more time discussing how to best prepare for the presentation, and provide samples of earlier good presentations to the students.

As for writing, fourteen (14) of 33 students achieved “excellent” performance, 18 students achieved “acceptable”, and 1 student achieved “unacceptable”. Most students achieved excellent or acceptable performance (32 of 33 students).

In the future, the instructor suggests giving the specs for this assignment earlier in the semester, so that students may have more time to work on it (as mentioned by some students in their evaluations of instruction).

As for CSCI 462 Software Engineering Practicum. SLO 3 was assessed in CSCI 462 in Spring 2018. In this course, the students are required to communicate in a variety of ways: wikis, poster presentations, blogs, and oral presentations. All 27/27 (100%) met the target level of 80% performance on this SLO in this course in Spring 2018 across all mediums of communication.

Although all students met the acceptable level of performance, the instructor felt that the class had low energy this year and that future performance could be improved by the introduction into the class of outside speakers and field trips.

Computer Science - BS

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):.

There are three issues that occurred in 2017-18 assessment compared to previous assessment cycles:

1. Due to changes the the ABET-Computing Accreditation Commission's changes in its Criteria for accrediting computer science programs, the number of outcomes to be considered dropped from 11 to 6. The department adopted these outcomes as its own and from now on will assess all of them over a two-year cycle (three in year one and three in year two) rather than a three year cycle. The 2017-18 cycle represents the first assessment with the new outcomes and was done in preparation for our ABET visit in September 2018.
2. The department has been using a graduate TA for one of its Programming I laboratories (CSCI220L) and has collected data on student performance in this course with the TA to see if there is a difference in student performance.
3. Beginning in 2015, the department changed the prerequisites for CSCI 362 (Software Engineering) to include CSCI 230 (Data Structures). The 2017-18 cycle provided the first time to assess the impact of this change.

Results  The following are the student outcomes assessed in 2017-18

1. Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline.
3. Communicate effectively in a variety of professional contexts.

SLO 1 and SLO 2: With regard to the first two Student Learning Outcomes, student performance was measured in CSCI 220/221L (where these two learning outcomes are first introduced) and CSCI 362.

In CSCI 220, Student performance on these SLO was measured by the Final Exam in the course. All questions on the exam is related to this SLO. The average student performance scores on the Final Exam were (the target performance is a score of 70%):

- Spring 2016: 74%
- Fall 2016: 73%
- Spring 2017: 74%
- Fall 2017: 81%

No downward inflection point in student performance was observed in the Spring 2017 semester (when the TA started), and therefore these results provide some quantitative data that suggest the switch to a TA in the lab sections has not had a negative effect on students’ performance in SLO 1 or SLO 2.

In CSCI 362. The same instructor taught this course regularly both before and after the prerequisite change, which provided a stable instrument to evaluate this SLO across semesters. The performance on the team programming projects in CSCI 362 which is directly related to this SLO was analyzed. The target is that student performance meet a satisfactory level of 80%. The recorded performance was:

- Fall 2013 – Section 1: 19/23 (82%), Section 2: 20/25 (80%)
- Fall 2014 – Section 1: 13/19 (68%), Section 2: 24/27 (89%)
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- Fall 2016 – Section 1: 16/19 (84%), Section 2: 21/21 (100%)
- Fall 2017 – Section 1: 16/16 (100%), Section 2: 18/25 (72%)

Although the pre-requisite change did not appear officially in the catalog until Fall 2016, students taking CSCI 362 in Fall 2015 were being advised that having CSCI 230 as a pre-requisite is beneficial. The above data suggests that the added pre-requisite does seem to have had a small improvement on the student’s performance on the programming project in CSCI 362, confirming that this was a good curricular improvement. Since Fall 2016, for example, a low performance of 68% has not been observed in any section of the course.

SLO 3: Communicate effectively in a variety of professional contexts.

With regard to the third Student Learning Outcome, student performances, student performance was measured in CSCI 392 and CSCI 462.

CSCI 392 Seminar on Computing and Society requires the students to deliver oral presentations and written papers. The course featured 13 research presentations by professors and professionals from various universities and companies and each student was asked to research either the ethical, legal, or social implications of a research speaker’s area, and present their findings to the class, for discussion and evaluation.

Student performance was evaluated by both the instructor and the student’s peers. Twenty (23) of 33 students achieved “excellent” performance, 8 students achieved “acceptable”, and 2 students achieved “unacceptable”. Most students achieved excellent or acceptable performance (31 of 33 students, 94%).

Although the target was met, in order to improve performance, in the future, the instructor suggested to spend more time discussing how to best prepare for the presentation, and provide samples of earlier good presentations to the students.

As for writing, fourteen (14) of 33 students achieved “excellent” performance, 18 students achieved “acceptable”, and 1 student achieved “unacceptable”. Most students achieved excellent or acceptable performance (32 of 33 students).
In the future, the instructor suggests giving the specs for this assignment earlier in the semester, so that students may have more time to work on it (as mentioned by some students in their evaluations of instruction).

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Although all students met the acceptable level of performance, the instructor felt that the class had low energy this year and that future performance could be improved by the introduction into the class of outside speakers and field trips.

Computing in the Arts - BA

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

Data Science - BS/Minor

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

Students achievement stayed the same or improved in rubrics A and B over the previous year, but this year the sample size was again small (N=6). The exit exam/evaluation is distributed via email, but this time only 6/10 participants took time to fill out the survey. In class time was given as well, but the participation was still lower than desired. One hypothesis is they were asked to do too many evaluations. End of semester evaluations + CS Department Exit Survey + Data Science Exit Evaluation.

The capstone assessment identified the biggest areas in need of improvement last year, and as you see from the detailed report we have achieved an improvement in this area. As always, the small sample size limits our ability to extract significant quantitative meaning from the results.

Geology - BA/Minor

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

GEOL 291: Water Resources and laboratory is a new course added in response to alumni survey responses recommending more lab- and field-based education and training to prepare future students for the changing professional realms and career opportunities that are transitioning into resource exploration and development, environmental pollution stresses on society, and climate change impacts.

Geology - BS

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

We have recently added GEOL 291: Water Resources and laboratory in response to alumni survey responses recommending more lab- and field-based education and training to prepare future students for the changing professional realms and career opportunities that are transitioning into resource exploration and development, environmental pollution stresses on society, and climate change impacts.

We have also capitalized on the long-term success of GEOL 360 and have added three new experiential, study-away courses in order to provide students with more choices and to engage more faculty in these types of courses.

Grice Marine Laboratory

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):
As a facility our goals are different from those of programs or departments. The mission of Grice Marine Lab is to support activities of faculty, staff, and students in education, research, and outreach. Currently our support for the use of boats, the dormitory, and the Molecular Core Facility (MCF) is meeting the needs of facility users. Demand is high for the MCF and the number of procedures increased by 20% over FY 17. However, we are facing aging equipment and replacement will need to be a priority. We also experienced increased demand for boats, though we have one less boat as it is on the market to be sold. Outreach activities continue to be strong, and reached 25% more children this year; however, the loss of a staff position is expected to most affect our ability to continue to devote staff to outreach. We hope to improve in these areas by (1) purchasing upgraded equipment for the MCF as funds become available, (2) selling a boat that is currently part of our fleet but receives relatively little use and purchasing a new boat that will enhance the capabilities of our fleet, and (3) implementing a new set of surveys to gauge satisfaction and efficacy of our outreach program.

Mathematics - BA

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

We terminated the program due to low or no enrollments.

Mathematics - BS/Minor

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

Over the past three assessment cycles, the department of mathematics, in part due to trying to assess the program, noticed the extremely low numbers of students in the BA in mathematics. Consequently, we decided to terminate the BA degree in mathematics beginning Fall 2018, with a teach-out plan that extended beyond for four years.

As you can see from the tables course tables below for the past three fiscal years, the courses where targets were not met jumped around. In our judgment, this variation in course results was due to small sample sizes. For that reason, departmental assessment committee decided that in order to gain better sense of overall performance for the measures, we needed to aggregate the results on three consecutive fiscal years. We are at the end of the three-year cycle and as the Comparative Table below indicates, there is some consistency in failing to meet targets at the higher level measures: 1.2, 2.2 and 3.2.

In response the three year aggregated assessment trends, the Department of Mathematics modified the tracks that make up the Mathematics B.S. program. The changes became effective this Fall 2018. Consequently, the FY 19 B.S./minor program assessment will be a modification of that for FY 18.

At our Departmental Assessment Committee meetings on August 20 and 22 2018, after analyzing the results of FY 18 program assessment, we decided to change the courses used for Measure 1.2, making uniform across tracks the course that will be used to obtain artifacts for Measure 1.2, and 2.2 and add another student learning outcome. This uniformity should provide better consistency in the data that we collect and improve its reliability.

As for Measure 3.2 where the results indicate a significant drop, well below the 75% target, we plan to increase uniformity across tracks in the courses used for Measure 3.2 with an expectation for the same improvements expected above for Measures 1.2 and 2.2. Also, since Measure 3.2 is a higher order measure of SLO 3, where the expectation is that students will be able to write complete, grammatically and logically correct arguments to prove their conclusions, we decided to study the structure and text used in Math 295 An Introduction to Abstract Mathematics, where students are taught how to write proofs. The objective of Math 295 is to serve as the foundation for proof writing. The poor results for Measure 3.2 suggest that the course may not effectively be serving this objective.

<table>
<thead>
<tr>
<th>Student Learning Outcomes</th>
<th>FY-16</th>
<th>FY 17</th>
<th>FY 18</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLO 1 Modelling Phenomena</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 1.1</td>
<td>100%</td>
<td>88%</td>
<td>100%</td>
</tr>
<tr>
<td>Measure 1.2</td>
<td>86%</td>
<td>60%</td>
<td>67%</td>
</tr>
<tr>
<td>------------</td>
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<td>-----</td>
</tr>
<tr>
<td>SLO 2 Applying Models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 2.1</td>
<td>96%</td>
<td>84%</td>
<td>91%</td>
</tr>
<tr>
<td>Measure 2.2</td>
<td>78%</td>
<td>60%</td>
<td>71%</td>
</tr>
<tr>
<td>SLO 3 Writing Arguments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 3.1</td>
<td>100%</td>
<td>84%</td>
<td>91%</td>
</tr>
<tr>
<td>Measure 3.2</td>
<td>68%</td>
<td>88%</td>
<td>46%</td>
</tr>
<tr>
<td>Measure 3.3</td>
<td>100%</td>
<td>No students</td>
<td>No students</td>
</tr>
<tr>
<td># Measures Not Meeting</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

As Table 3 indicates targets were met for 15 out of the 25 measures where artifacts were available. Targets were not met for the following:

- measures 1.2, 2.2, and 3.2 in the Pure track;
- measures 2.1 and 3.2 in the Applied track;
- measures 1.2 and 2.2 in the Teaching track;
- measure 3.1 and 3.2 in the Statistics track; and
- measure 3.2 in the Actuarial track.

FY 18

<table>
<thead>
<tr>
<th>Courses/Tracks</th>
<th>Pure</th>
<th>Applied</th>
<th>Teaching</th>
<th>Statistics</th>
<th>Actuarial</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 203</td>
<td>SLO 1,2,3/I*</td>
<td>SLO 1,2,3/I*</td>
<td>SLO 1,2,3/I*</td>
<td>SLO 1,2,3/I*</td>
<td>SLO 1,2,3/I*</td>
</tr>
<tr>
<td>Measure 1.1</td>
<td>5/5/100%</td>
<td>2/2/100%</td>
<td>#0</td>
<td>2/2/100%</td>
<td>2/2/100%</td>
</tr>
<tr>
<td>Measure 2.1</td>
<td>5/5/100%</td>
<td>1/2/50%</td>
<td>#0</td>
<td>2/2/100%</td>
<td>2/2/100%</td>
</tr>
<tr>
<td>Measure 3.1</td>
<td>5/5/100%</td>
<td>2/2/100%</td>
<td>#0</td>
<td>1/2/50%</td>
<td>2/2/100%</td>
</tr>
</tbody>
</table>

| MATH 245 | SLO 1&2/E | SLO 1&2/E |
| Measure 1.2 | 1/1/100% | #0 |
| Measure 2.2 | 1/1/100% | #0 |

| MATH 311 | SLO 3/E* | SLO 3/E* |
| Measure 3.2 | 1/5/20% | 3/7/43% |

| MATH 323 | SLO 1&2/E* | SLO 1&2/E* |
| Measure 1.2 | 4/8/.67% | 5/6/83% |
| Measure 2.2 | 4/8/.67% | 5/6/83% |

| MATH 340 | SLO 3/E* |
| Measure 3.2 | 3/3/100 |

<p>| MATH 411 | SLO 3/R |
| Measure 3.3 | #0 |</p>
<table>
<thead>
<tr>
<th>Courses/Tracks</th>
<th>Pure</th>
<th>Applied</th>
<th>Teaching</th>
<th>Statistics</th>
<th>Actuarial</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 203</td>
<td>SLO 1,2,3/l*</td>
<td>SLO 1,2,3/l*</td>
<td>SLO 1,2,3/l*</td>
<td>SLO 1,2,3/l*</td>
<td>SLO 1,2,3/l*</td>
</tr>
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<td>Measure 1.1</td>
<td>N=2/2/100%</td>
<td>N=9/7/78%</td>
<td>N=6/6/100</td>
<td>N=1/1/100%</td>
<td>N=7/6/86%</td>
</tr>
<tr>
<td>Measure 2.1</td>
<td>N=2/2/100%</td>
<td>N=9/7/78%</td>
<td>N=6/5/83.3</td>
<td>N=1/1/100%</td>
<td>N=7/6/86%</td>
</tr>
<tr>
<td>Measure 3.1</td>
<td>N=2/1/50%</td>
<td>N=9/8/89%</td>
<td>N=6/6/100</td>
<td>N=1/0/0%</td>
<td>N=7/6/86%</td>
</tr>
<tr>
<td>MATH 245</td>
<td>SLO 1&amp;2/E*</td>
<td>SLO 1&amp;2/E*</td>
<td>SLO 1&amp;2/E*</td>
<td>SLO 1&amp;2/E*</td>
<td>SLO 1&amp;2/E*</td>
</tr>
<tr>
<td>Measure 1.2</td>
<td>N=0</td>
<td></td>
<td>N=2/1/50%</td>
<td>N=2/1/50%</td>
<td></td>
</tr>
<tr>
<td>Measure 2.2</td>
<td>N=0</td>
<td></td>
<td>N=2/1/50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 3.2</td>
<td>N=2/2/100%</td>
<td>N=6/5/83%</td>
<td>SLO 3/E*</td>
<td>N=2/1/50%</td>
<td></td>
</tr>
<tr>
<td>MATH 323</td>
<td>SLO 1&amp;2/E*</td>
<td>SLO 1&amp;2/E*</td>
<td>SLO 1&amp;2/E*</td>
<td>SLO 1&amp;2/E*</td>
<td>SLO 1&amp;2/E*</td>
</tr>
<tr>
<td>Measure 1.2</td>
<td>N=1/1/100%</td>
<td>N=8/4/50%</td>
<td>N=8/4/50%</td>
<td></td>
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<tr>
<td>Measure 2.2</td>
<td>N=1/1/100%</td>
<td>N=8/4/50%</td>
<td></td>
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</tr>
<tr>
<td>Measure 3.2</td>
<td>N=2/2/100</td>
<td>SLO 3/E*</td>
<td>SLO 3/E*</td>
<td>SLO 3/E*</td>
<td>SLO 3/E*</td>
</tr>
<tr>
<td>Measure 3.3</td>
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<td></td>
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</tr>
<tr>
<td>Measure 3.2</td>
<td>N=1/1/100%</td>
<td>N=5/4/80%</td>
<td>SLO 3/R*</td>
<td>SLO 3/R*</td>
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</tr>
<tr>
<td>MATH 470</td>
<td>SLO 1&amp;2/R*</td>
<td>SLO 1&amp;2/R*</td>
<td>SLO 1&amp;2/R*</td>
<td>SLO 1&amp;2/R*</td>
<td>SLO 1&amp;2/R*</td>
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<tr>
<td>Measure 1.2</td>
<td>N=4/3/75%</td>
<td>SLO 1&amp;2/R*</td>
<td>SLO 1&amp;2/R*</td>
<td>SLO 1&amp;2/R*</td>
<td>SLO 1&amp;2/R*</td>
</tr>
<tr>
<td>Courses/Tracks</td>
<td>Pure</td>
<td>Applied</td>
<td>Teaching</td>
<td>Statistics</td>
<td>Actuarial</td>
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<tr>
<td>MATH 203</td>
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</tr>
<tr>
<td>N=1/100</td>
<td>N=9/9/100 N=6/6/100 N=2/2/100 N=9/9/100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure 1.2</td>
<td>N=0</td>
<td>N=1/100</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Measure 2.2</td>
<td>N=0</td>
<td>N=1/100</td>
<td></td>
<td></td>
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<tr>
<td>MATH 311</td>
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<td></td>
<td></td>
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<tr>
<td>N=2/2/100</td>
<td>N=6/6 100</td>
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<tr>
<td>Measure 3.2</td>
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<tr>
<td>N=2/2/100</td>
<td>N=4/3/75</td>
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<td>Measure 2.2</td>
<td>N=2/1/50 N=6/5/83.3</td>
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<tr>
<td>MATH 340</td>
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<tr>
<td>N=2/2/100</td>
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<tr>
<td>MATH 411</td>
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<tr>
<td>SLO 3/R</td>
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<tr>
<td>Measure 3.3</td>
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<tr>
<td>MATH 430</td>
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</tr>
<tr>
<td>N=3/2/66.7</td>
<td>N=9/3/33.3</td>
<td></td>
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<tr>
<td>Measure 3.2</td>
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<tr>
<td>MATH 470</td>
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<tr>
<td>N=0</td>
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</tr>
<tr>
<td>Measure 1.2</td>
<td>N=0</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Measure 2.2</td>
<td>N=0</td>
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</tr>
</tbody>
</table>

**Astronomy - BA/Minor**

**Assessment Report Summary**
Astrophysics - BS

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

During the 2017-2018 academic year, the Astrophysics BS program was assessed based on the following courses: ASTR 231 (Introduction to Astrophysics), ASTR 306 (Planetary Astronomy), ASTR 311 (Stellar Astronomy and Astrophysics), ASTR 312 (Galactic and Extragalactic Astronomy), ASTR 377 (Experimental Astronomy), and PHYS 405 (Thermal Physics).

ASTR 231 was assessed to determine whether students have obtained a basic conceptual understanding of modern astrophysics, which includes celestial coordinates, Kepler's laws, and stellar properties. The data from this current year is conspicuously lower than all previous years, which may indicate that the results from this year may be considered an outlier, rather than evidence of a trend. At the Annual Faculty Retreat, the Department discussed whether or not the assessment questions for ASTR 231 should be standardized by creating a "question bank". A larger sample of questions for this SLO may provide a more representative average of student performance in cases where the difficulty level of questions varies.

ASTR 311, ASTR 312, and PHYS 405 were assessed to determine whether students are able to apply quantitative and computational skills to more advanced astrophysics-related problems. The current data shows that many students have the ability to apply computational skills learned in previous courses. The Physics Department will continue to discuss how we can improve the computational skills of our Physics BS majors. One specific suggestion has been offered by the faculty which would affect Astrophysics BS students: introducing a computational physics course that would be suitable to our needs as a Department.

ASTR 377 was assessed to determine whether students have obtained the tools of data analysis and experimentation. Based on the data from this year and the past three academic years, the results indicate that students are learning these tools associated with basic experimentation along with technical writing and scientific presentation skills. In light of these results, the Physics Department suggests that the benchmark should be raised for this course from 75% to 80%.

Biomedical Physics - Minor

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

There are just a couple of interdisciplinary minors at the College of Charleston and Biomedical Physics (BMPH) is one of the very challenging. At the same time, the minor prepares the students for a rewarding career in biomedical field. We believe that the core courses of this BMPH, i.e. PHYS 203 Physics and Medicine and PHYS 396 Biophysical Modeling of Excitable Cells, served very well the set goals and measures for this program.

Specific Recommendations for each Student Learning Outcome (SLO)

SLO 1. Conceptual Understanding of Biophysical Processes. Based on 2016-2017 assessment data for BIOL 396/PHYS 396, we recommend adding more conceptual questions and practice more concept questions during the lecture and review sessions to make sure all students have a solid understanding of biophysics. To improve the results, also include concept questions within homework assignments.

SLO 2. Problem Solving Skills in Biomedical Physics. It would be helpful to have more quantitative problems that involve both calculating the actual result and the appropriate units through dimensional analysis. During 2016-2017 assessment of BIOL 396/PHYS 396, we identified that students have troubles carrying out explicit, step-by-step, calculations and dimensional analysis. Therefore, it would be recommended to continue solving more problems in class and during the review sessions. It would also be helpful for this core course (PHYS 396) if the students would come from the introductory/general physics courses with more examples of dimensional analysis.

SLO 3. Computational Skills in Biomedical Physics. BIOL 396 / PHYS 396 simulates and challenges students to go outside their comfort zone and learn how to read and implement in a computer code differential (rate) equations that mimic the activity of excitable cells. Consistent with previous years' assessments, we found that the way BIOL 396/PHYS 396 curriculum is organized and taught
does not need computer science (CS) prerequisites and we were right not to require CS for this course since the focus is not on computer programming, but rather on simulating biological phenomena.

The evaluation criteria showed that the students are well-versed in connecting mathematical equations with the corresponding computer code. Regardless of whether other courses could do and without increasing the numbers of pre-requisites for this class, we recommend focusing a lecture or two on some best practice strategies in programming.

General/Curricular Recommendations

Aside from specific recommendation for BIOL 396/PHYs 396, we recommend carrying out the assessment on the other core course PHYs 203 Physics and Medicine. For the last three years, all assessment results regarding Biomedical Physics Minor are based only BIOL 396/PHYs 396. Although the course is critical for the interdisciplinary nature of this minor, it remains only one data point and may not reflect the actual state of the minor.

Caveats. The population size of this class (n = 4) is small and, therefore, the fluctuations could be significant. For a usual 95% confidence interval in our population standard deviation (std. dev.) with n = 10, the error in estimation the std. dev. is 40%. The estimation error of std. dev. decreases somewhat, but very slowly, by increasing the population (class) size. For example, the error on std. dev. estimation is 40% for n = 10, 30% for n = 20, and 20% for n = 47.

Additional summary on PHYs 270 elective:

There were two declared biomedical physics minors in the PHYs 270 (Nanotechnology in Medicine) class. First, students were assessed on their ability to comprehend conceptual questions in waves and spectroscopy. Questions administered during the midterm tests and quizzes in PHYs 270 were assessed to measure student knowledge. Both students reached the benchmark for outcome 1. Although students did well on homework problem solving and met the benchmark for measure 2 (outcome 2), one student did not meet the problem solving part related to waves and spectroscopy administered in the final exam. As far as computational projects are concerned, both students met the benchmark. Although our conclusions are still based on small number statistics, the results of this assessment suggest that additional emphasis needs to be provided in the problem solving part, especially problems related to spectroscopy. We will continue to collect data over the next year for this course, and these results will be discussed with the faculty assigned to teach this course in the spring 2019 semester.

Meteorology - BA

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

Physics - BA/Minor

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

During the 2017-2018 academic year, the Physics BA program was assessed based on the following courses: PHYs 230 (Modern Physics), PHYs 270 (Nanotechnology and Medicine), PHYs 320 (Introductory Electronics), and PHYs 370 (Experimental Physics).

PHYs 230 was assessed to determine whether students have obtained a basic conceptual understanding of modern physics, which includes special relativity, wave-particle duality, properties of quantum mechanical wavefunctions, and the limitations of classical physics. Although there were only two students assessed in PHYs 230, these students did not meet the benchmark. Based on this result and the results associated with the Physics BS students, the Physics Department are planning to address some of the deficiencies of this course by introducing and reinforcing some of the material (such as special relativity) into PHYs 112 (General Physics II), which is a prerequisite for PHYs 230.

PHYs 270 and 320 was assessed to determine whether students are able to apply numerical and computational skills to problem solving in electromagnetism, optics, spectroscopy, and waves. The two Physics BA students who enrolled in these courses met the benchmark for this measure and it was suggested by the Physics Department should continue to collect data to determine whether there are trends that should be noted in the future.

Finally, PHYs 370 was assessed to determine whether students have obtained the tools of data analysis and experimentation. The Physics BA student enrolled in this course met the benchmark. Based on the data from this year and previous year, the results indicate that students are learning these tools associated with basic experimentation along with technical writing and scientific presentation skills. In light of these results, the Physics Department suggests that the benchmark be raised for this course from 75% to 80%.

Because of small number statistics, it is necessary to continue to collect data in order to make firm and confident conclusion about the future direction of the program.
Physics - BS

Assessment Report Summary

7. Summary of Assessment Results with Focus on Program Improvement: Describe evidence-based changes that have taken place within the last few assessment cycles because of assessment. Statements must be supported by evidence from the assessment report(s):

During the 2017-2018 academic year, the Physics BS program was assessed based on the following courses: PHYS 230 (Modern Physics), PHYS 301 (Classical Mechanics), PHYS 370 (Experimental Physics), PHYS 403 (Quantum Mechanics I), PHYS 409 (Electromagnetism I), PHYS 419 (Research Seminar), and PHYS 420 (Senior Research).

PHYS 230 was assessed to determine whether students have obtained a basic conceptual understanding of modern physics, which includes special relativity, wave-particle duality, properties of quantum mechanical wavefunctions, and the limitations of classical physics. In examining the data from 2015 to the current academic year, there is clear evidence of a positive trend in student learning. This is largely due to the renewed emphasis on practical problem-solving techniques that are being emphasized in PHYS 111 and 112 (General Physics I and II), which are prerequisites for PHYS 230. Because of the positive trend with the data, the Physics Department has suggested that we continue along the path that we are currently taking to improve PHYS 230. Furthermore, the Department has suggested that reinforcing some modern physics topics (such as special relativity) in PHYS 112 will be helpful in improving student learning.

PHYS 301, 403, and 409 were assessed to determine whether students are able to apply quantitative and computational skills to more advanced physics-related problems. In examining the data from 2015 to the current academic year, there has been improvement in the topics that are assessed in PHYS 301 (such as Lagrangian mechanics); however, the results from PHYS 403 and 409 were markedly lower than the results from the past three academic years. As a result, the Physics Department will continue to discuss how we can improve the computational skills of our Physics BS majors. Two specific suggestions have been offered by the faculty: (1) introducing a computational physics course that would be suitable to our needs as a Department and (2) applying more computational assignments in PHYS 230, which is a prerequisite for PHYS 403 and 409.

PHYS 370 was assessed to determine whether students have obtained the tools of data analysis and experimentation. Based on the data from this year and the past three academic years, the results indicate that students are learning these tools associated with basic experimentation along with technical writing and scientific presentation skills. In light of these results, the Physics Department suggests that the benchmark should be raised for this course from 75% to 80%.

Finally, PHYS 419 and 420 were assessed to determine whether students are able to formulate and complete an independent research project. Based on the data from this year and the past three academic years, the results indicate that students are learning the tools necessary to formulate and complete an independent research project. This also means that students have learned the necessary technical writing and scientific presentation skills needed to complete the capstone course and that the students are able to synthesize the tools used throughout their physics education. Based on the results from the students, our Department has discussed raising the assessment target for this goal from 75% to 80%.