**Sinclair Community College**

**Continuous Improvement Annual Update 2015-16**

**Please submit to your Division Assessment Coordinator / Learning Liaison for feedback no later than March 1, 2016**

**After receiving feedback from your Division Assessment Coordinator, please revise accordingly and make the final submission to your dean and the Provost’s Office no later than May 2, 2016**

**Department:** **SME - 0355 - Chemistry / 0357 - Geology**

Year of Last Program Review: FY 2012-2013

Year of Next Program Review: FY 2018-2019

**Section I: Progress Since the Most Recent Review**

Below are the goals from Section IV part E of your last Program Review Self-Study. Describe progress or changes made toward meeting each goal over the last year. Responses from the previous year’s Annual Update are included, if there have been no changes to report then no changes to the response are necessary.

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| **GOALS** | **Status** | **Progress or Rationale for No Longer Applicable** |
| It is the collective goal of the department to have all students successfully complete the courses in which they enroll. Faculty in the department have open-door policies for students who need additional help.  | In progress [ ] Completed [x] No longer applicable [ ]  | All instructors continue to have an open-door policy to help any student who seeks it. Additionally, we encourage students to visit the Chemistry and Geology Resource Centers when they need help. |
| While Geology has very little attrition, most of which is related to financial issues rather than academic, Chemistry, because of its more mathematical and conceptual character, loses a sizeable percentage of students during the semester. This is often due to students enrolling in the course without the needed skill set or background. Better advising and better control of student enrollment can improve this to some degree, but Chemistry also needs to look for other methods of instruction to meet the students’ needs. This is being addressed in part by redesigning the Introductory Chemistry course to include more interactive activities between small groups of students and tutors employed by the department. | In progress [x] Completed [ ] No longer applicable [ ]  | The pilot program in which small groups of students interact on-line that was started in 2013 proved to be too difficult to implement consistently. The two primary issues with its success were finding enough capable tutors and convincing students to commit to participating at the available times. The full-time faculty continue to explore alternate methods of delivery and look for on-line sources of additional help for the students.The implementation of career communities has improved, to some degree, the success rate for students taking chemistry. There still is more work we need to do, however, particularly as it applies to which beginning chemistry course students should be enrolled. Sometimes, students who only need a science course are enrolled in Introductory Chemistry, which has a higher mathematical component than College Chemistry. This can lead to a lower probability for success. Students who need General Chemistry are still sometimes enrolled into that course with no previous chemistry background. Again, we have found that these students are at a greater risk of failure. This may become a greater challenge now with the changes in the financial support for students. Since classes not directly related to a student’s course of study are no longer supported by financial aid, students are more likely to chance a course for which they may not be prepared. The same is true as it relates to math prerequisites for some courses. We will need to monitor the extent to which these changes affect student success. |

Below are the Recommendations for Action made by the review team. Describe the progress or changes made toward meeting each recommendation over the last year. Responses from the previous year’s Annual Update are included, if there have been no changes to report then no changes to the response are necessary.

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| **RECOMMENDATIONS** | **Status** | **Progress or Rationale for No Longer Applicable** |
| Repairs that are needed to Chemistry labs were mentioned during the meeting with the review team. The team was particularly concerned about ventilation repairs that were reported as being needed. Given the department’s commitment to safety, there is no doubt that the department is interested in seeking repairs as soon as possible, and while it may be too late to address these repair needs in the Capital Request process for this year, other sources of funding for these repairs should be explored with the division dean. | In progress [ ] Completed [x] No longer applicable [ ]  | Labs 12343 and 12344 were renovated during the summer of 2015; lab 12393 during the winter break of 2015. After renovation of the first two labs was complete, it was discovered that the bench surface, though impervious to chemicals, was sensitive to heat. The proper material for the lab surfaces in 12393 was not available at renovation; all reaction surfaces are scheduled to be replaced as the correct material becomes available. In the meantime, the labs are functional and the changes made have improved the ability of the instructor to better monitor the students’ activities.Refurbishing 12395 is slated for the summer of 2016. |
| During the meeting with the review team the department noted that students struggled due to inadequate math skills in introductory chemistry courses. The department has done a nice job of identifying the problem, although in the subsequent discussion it was not clear whether there is certainty regarding exactly what is causing the problem. As noted in the commendations, the department has demonstrated skill in the past in using data to solve problems and make decisions, and the review team recommends that the department employ this skill to attempt to resolve this issue. The department is encouraged to explore ways to help students develop the math skills they need to succeed in Chemistry courses, and assess the impact of any measures they implement. There may be opportunities to employ online resources to bolster math skills, perhaps a collaborative effort with the math department could lead to the development of approaches that would help Chemistry students achieve higher levels of success by improving math skills. | In progress [x] Completed [ ] No longer applicable [ ]  | Recent changes to the financial aid support for students has introduced new problems for the potential success of students in Introductory Chemistry. The most basic of the prerequisite courses is no longer subject to financial aid. The college is looking for ways to constructively deal with this issue. In the meantime, the Developmental Math team has incorporated more story problems in this course, many of them slanted toward scientific issues. We will continue to monitor student success as it relates to this developmental math course. Success rates will be determined for three groups – those students who do not need the course, those who need it and pass it, and those who need it, but do not take it or pass it.We have students in the General Chemistry course who struggle with mathematically related concepts. These student have passed the prerequisite course, but it isn’t clear they have mastered the concepts. Internally, we are exploring ways to counter this problem. |
| The Geology component of the department lacks visibility, and there is some indication that this may have impacted enrollment. The chair indicated that increasing visibility for Geology has been a concern since he took over leadership of the department, and it is recommended that the department move forward with efforts to once again incorporate Geology into the department name and prioritize other appropriate efforts to increase the visibility of the Geology segment of the department. | In progress [ ] Completed [x] No longer applicable [ ]  | This is now complete. Geology is satisfied with the ability for outside entities, including potential students, to find them through the college web site. |
| It was noted that the program outcomes that the department is using are the ones that were used when Chemistry was merely an emphasis area under Liberal Arts and Sciences. Now that Chemistry is being treated as a stand-alone degree program, it would be appropriate to develop some program outcomes that are targeted for Chemistry. The existing outcomes may be kept if that is the department’s wish, but they should be supplemented by outcomes that distinguish Chemistry from other degree programs. It is recommended that the department work with the division learning liaison to develop effective and measurable outcomes.  | In progress [ ] Completed [x] No longer applicable [ ]  | Program outcomes specific to chemistry have been created. Because this is a new set of outcomes, assessment data will be collected in the coming year. |
| The recommendations from the previous Program Review were not addressed in the current self-study – the department should prioritize work on these recommendations from the last Program Review, as summarized below:**Recommendations for Action**:1. Develop evidence of student learning outcomes attainment and share the analyses with associated LHS departments to identify improvement targets
2. Enlist the support of RAR to investigate the promise of prerequisites in courses where student success is compromised due to perceptions of inadequate academic background.
3. Validate the department’s assertion there is a difference in student performance based on instruction by full-time versus part-time faculty through an RAR-supported study
4. Conduct a needs analysis to identify part-time faculty development opportunities; deliver workshops and other training as appropriate.
5. Evaluate and pilot alternative modes of lecture/lab delivery through hybrid course formats and distance learning opportunities (off campus locations, too) as new models emerge
	1. Benchmark other institutions and other departments on campus
	2. Work with Distance Learning to identify current examples
	3. Track students who transfer to obtain systematic feedback for the department’s use in refining curriculum and instruction
 | In progress [x] Completed [ ] No longer applicable [ ]  | Complete. A recent survey taken by students in the final chemistry course indicated they felt positive about the knowledge and capabilities gained during their Sinclair chemistry experience. Students responded to the following statements with a rating from 1 to 5, 5 being the highest:1. I have become more confident performing laboratory procedures (4.3)
2. I have gained better study skills (4.0)
3. I have learned to communicate written lab results (4.4)
4. I have improved my ability to think analytically (4.3)
5. I have gained knowledge to better understand how chemicals affect my daily life and their relationship to health (4.0)

This assertion is supported by the following data. This data is specific for Introductory Chemistry, but we would expect to see similar data for General Chemistry. #1: Completed DEV 108 before taking CHE 120 #2; Did not complete DEV 108 before taking CHE 120 #3: Did not need to take DEV 108% Success Rates for CHE 120 (now CHE 1111)

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|  | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 |
| #1 | 75% | 70% | 62.9% | 61% | 54.6% | 59.5% |
| #2 | 61.4% | 61.3% | 56.0% | 53.4% | 51.1% | 53.6% |
| #3 | 67.85 | 69.1% | 70.6% | 67.5% | 65.2% | 73.9% |
| Overall | 65.9% | 67/2% | 66.5% | 63.1% | 60.3% | 66/6% |

From this data, it is clear that students who do not have the prerequisite background are not as successful as those who have demonstrated the necessary mathematical ability. This data is rather old, but we expect that these observations still exist and will collect more recent data. A survey of the General Chemistry instructors supports this assertion and we will work with RAR in the coming year to collect more recent data for both first-year courses.In progress. Success rates are being tallied and compared among adjuncts and full-time faculty. Initial results support this assertion to some degree; there are more complaints generated by students of adjunct faculty than are produced by students of full-time faculty. However, we have several adjuncts whose students have given high marks for their classroom presentations. In this next year, we will enlist the aid of RAR to gather more substantive data.One of the challenges faced by the department is the development of adjunct faculty. Most of the adjunct faculty have full-time jobs elsewhere, so finding the time for them to attend workshops and other training is a challenge. We continue to monitor their work and offer suggestions and intervention where needed and appropriate.In progress.We currently have two Chemistry courses offered online. One of these has online labs. We are exploring the possibility of increasing the number of courses offered online, but are skeptical of including the lab component online. It is the feeling of the department that, for the labs associated with the health-related chemistry and the beginning course for chemistry majors, the students need to learn to properly use lab equipment, something not easily done without the immediate feedback in a normal lab setting that is not readily available in an online format. Geology is exploring a hybrid format for their beginning geology course.This is a college-wide issue. We have not been able to systematically contact previous students except as they visit Sinclair or make contact with Sinclair instructors. Generally speaking, each previous student has expressed appreciation for the instruction received at Sinclair. We now have a list of recent graduates from whom we can obtain feedback. |
| Work with the Academic Staffing Coordinator to identify and implement a sustainable strategy to recruit part-time faculty members | In progress [x] Completed [ ] No longer applicable [ ]  | This is a major issue for both Chemistry and Geology. It is quite difficult to find qualified instructors, with appropriate knowledge and teaching skills, in both of these areas who are available at the times needed. Numerous advertisements have been placed in the local papers with limited results, particularly in the Dayton area. In the past year we have hired several new adjunct faculty to replace those who have moved on. We will continue to pursue all leads to create a list of potential adjunct instructors. |
| As experienced faculty members consider retirement, it is recommended that the department develop formal approaches for documenting their knowledge so that as much as possible is preserved before these faculty members transition out of the department. | In progress [x] Some completed [x] No longer applicable [ ]  | We now have documents for the first semester of Introductory and General Chemistry. These documents define the concepts that must be completed by the end of the term, those that can be included at the instructor’s discretion, and topics considered to be beyond the scope of the course. A list of available demonstration kits are included with each document as are other suggestions for concept presentation. These documents will be made available to each instructor to guide their individual classroom preparation. They are also expected to minimize the instructional variability between sections yet allow for some variation in emphasis based on the individual instructor's interests. We are now working on similar documents for the second semester of each of the above courses. Implementation of similar documents for College Chemistry and Organic Chemistry are in the works. |
| The Program Review is an opportunity to highlight department successes, innovations, and strengths – it was the sense of the review team that there are a number of impressive things the department is doing and a number of faculty achievements that were not communicated in the self-study. The department should utilize the Program Review and Annual Update processes to spotlight its strengths. Prior to future Annual Update and Program Review submissions, the department should engage in some deep reflection regarding successes that should be shared. The review team also felt that there could have been more reflection regarding opportunities for improvement in the department. While some challenges were mentioned, often solutions were not proposed or discussed in the self-study. The review team requests that the department conduct a more extensive Strengths/Weaknesses/Opportunities/Threats analysis and share it with the Provost’s Office within the next three months to ensure that the department is able to benefit from the self-assessment and thoughtful reflection that are one of the major benefits of the Program Review process and that should guide the development of the self-study. The self-study document isn’t really the end product of Program Review – the opportunity for departmental self-reflection and improvement is really what the process is designed to produce. | In progress [x] Completed [ ] No longer applicable [ ]  | This is still in discussion. |

**Section II: Assessment of General Education & Degree Program Outcomes**

The Program Outcomes for the degrees are listed below. **All program outcomes must be assessed at least once during the 5 year Program Review cycle, and assessment of program outcomes must occur each year**.

**PLEASE NOTE – FOR THE PREVIOUS YEAR AND THIS YEAR, REPORTING OF GENERAL EDUCATION OUTCOME ASSESSMENT HAS BEEN TEMPORARILY POSTPONED. WE WOULD ASK THAT IN THIS ANNUAL UPDATE YOU IDENTIFY AT LEAST ONE COURSE IN YOUR DEGREE PROGRAM(S) WHERE ASSESSEMENT AT THE MASTERY LEVEL WILL OCCUR FOR THE FOLLOWING GENERAL EDUCATION OUTCOME:**

* **Cultural Diversity & Global Citizenship: Apply knowledge of cultural diversity to real world context by acknowledging, understanding, and engaging constructively within the contemporary world.**

**PLEASE RESPOND TO THE FOLLOWING QUESTIONS:**

**Do you have a required course in your program curriculum where Cultural Diversity & Global Citizenship could be assessed for mastery?**

[ ] **Yes** [x] **No If yes, please list the course:** Click here to enter text.

**If no, is there an elective course that is listed on your Preferred Program Pathway Template where Cultural Diversity & Global Citizenship could be assessed for mastery?**

[x] **Yes** [ ] **No If yes, please list the course:** Intro. to Cultural Anthropology, SOC 1145

**If no, is there another elective course that is an option in your program curriculum where Cultural Diversity & Global Citizenship could be assessed for mastery?**

[ ] **Yes** [ ] **No If yes, please list the course:** Click here to enter text.

**If no, where do students master Cultural Diversity & Global Citizenship in your program? Do you need assistance incorporating this General Education outcome into your degree program?**

**In our chemistry courses, instructors are expected to address this issue by using current issues, particularly as they relate to the environmental impact from the use of chemicals. The intent is to raise awareness of how chemicals can affect, either positively or negatively, the biodiversity around us. Currently, we have no good way to assess if students have mastered this competency and need to determine how best to do so.**

**NOTE THAT THERE WILL NEED TO BE AT LEAST ONE EXAM / ASSIGNMENT / ACTIVITY IN THIS COURSE THAT CAN BE USED TO ASSESS MASTERY OF THE COMPETENCY.**

**YOU MAY ALSO SUBMIT ASSESSMENT RESULTS FOR THIS GENERAL EDUCATION COMPETENCY IF YOU HAVE THEM, BUT IT WILL BE CONSIDERED OPTIONAL**.

Note: In the last Program Review, the team encouraged our department to review the program outcomes that were then current. This has been done and will be reassessed in the coming year. A two-year Geology AS program has been implemented; program outcomes will be determined in the coming year and will be added to the next Annual Report.

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| **Program Outcomes** | To which course(s) is this program outcome related? | Year assessed or to be assessed. | Assessment MethodsUsed | What were the assessment results? (Please provide brief summary data) |
| Demonstrate a foundational knowledge of inorganic and organic chemical principles, theories, and concepts. | CHE 1211/1251CHE 1221/1261CHE 2111/2151 CHE 2121/2161 | 2015-2016 | The department uses comprehensive final exams for all these courses. Expected passing rate is 70%. |  |
| Apply chemical concepts, mathematical techniques, and critical thinking skills to solve chemical problems. | CHE 1211/1251CHE 1221/1261CHE 2111/2151 CHE 2121/2161 | 2016-2017 | Nearly 80% of the final exams for the General Chemistry sequence (CHE 1211/1221) requires critical thinking/problem solving skills. This increases to 100% for the Organic Chemistry courses. | 83% of the students in the General Chemistry sequence exhibited mastery of this skill. |
| Demonstrate an ability to use scientific methods, and scientific reasoning in the laboratory to make observations, gather and analyze data, and evaluate and interpret experimental results from wet chemical and instrumentation methods. | CHE 1251CHE 1261CHE 2151CHE 2161  | 2017-2018 | Both sequences expect students to collect and analyze data. Reports are graded on completeness, accuracy, and correct analysis. Passing is 70% or higher. |  |

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| **Are changes planned as a result of the assessment of program outcomes? If so, what are those changes?**  |  |
| **How will you determine whether those changes had an impact?**  |  |

PLO#1: Demonstrate a foundational knowledge of inorganic and organic chemical principles, theories, and concepts.

PLO#2: Apply chemical concepts, mathematical techniques, and critical thinking skills to solve chemical problems.

PLO#3: Demonstrate an ability to use scientific methods, and scientific reasoning in the laboratory to make observations, gather and analyze data, and evaluate and interpret experimental results from wet chemical and instrumentation methods.