

# Search Standards By User

Source: IPR

Cycle: Instructional Program Review 2016-17

User Name: Lead Faculty, Chemistry

Response Types: All Responses Types

1	<b>Executive Summary</b>
0	Executive Summary

Summarize your program's strengths, opportunities, challenges, and action plans. This information will be presented to the Board of Trustees. [1000 word limit]

## Response Detail

No Response Information to Display

## Narrative

The chemistry department provides educational opportunities for students to acquire discipline specific fundamental background and laboratory skills necessary to be successful in chemistry related fields. Analytical laboratory instrumentation such as Gas Chromatography (GC) and Infrared Spectroscopy (IR) is an integral part of the curriculum. Additional advanced instrumentation such as High Pressure Liquid Chromatography (HPLC) and Nuclear Magnetic Resonance (NMR) is used by Honors students conducting undergraduate research but it should be accessible to all students. The challenge stems from the lack of dedicated support staff who can maintain the instruments and supervise the Honors students. The need for support staff with expertise in chemical instrumentation was identified. Also, the need for HPLC training of all the chemistry staff by a certified instructor is needed. We will work with the Professional Development Director to coordinate that training. The safety of our students is of utmost importance to us. Due to ever changing regulations, policies and procedures on safety and response on emergency situations, we believe our students are better served if we have a District certified emergency response instructor come to our laboratories on the first week of class to explain current protocols. Additionally, the chemistry staff will benefit from a training in hazardous materials management to ensure compliance with Federal and State regulations. The department will continue its ongoing efforts towards safer and cost effective laboratory curriculum. The department will also continue efforts to improve retention and completion by working closely with the Counseling Department and the Learning Center to identify ways to improve student support services. Securing qualified tutors for several chemistry classes has proven to be extremely difficult. To eliminate completion barriers, the Elementary Chemistry prerequisite for the General Chemistry sequence was removed. However, an alternative method to help students, who need preparation, get ready was identified. We will offer CHEM Jam in the fall of 2017, just prior to the start of the fall semester. We will work closely with the STEM Center to follow their lessons learned and their best practices from successfully implementing MATH Jam and PHYSICS Jam.

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

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## 2 Program Context

### 1 Mission

Identify how your program aligns with the college's mission by stating which categories of courses you offer: Career Technical, Basic Skills, Transfer, and/or Lifelong Learning. If your program has a mission statement, you may include it here.

#### Response Detail

No Response Information to Display

#### Narrative

Career Technical ?Basic Skills Transfer Lifelong Learning

#### Mission statement:

The mission of the chemistry department is to offer rigorous, sufficient and updated course work to support all students in achieving their individual academic goals: Associate degree in Physical Sciences; preparation for transfer into STEM fields; general education; and personal enrichment are the current exit points.

#### Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

### 2 Articulation

Are there changes in curriculum or degree requirements at high schools or 4-year institutions that may impact your program? If so, describe the changes and your efforts to accommodate them. If no changes have occurred, please write "no known changes".

#### Response Detail

No Response Information to Display

#### Narrative

"No known changes"

#### Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

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## 3 Community and Labor Needs

Are there changes in community needs, employment needs, technology, licensing, or accreditation that may affect your program?. If so, describe these changes and your efforts to accommodate them. If no changes have occurred, please write "no known changes". CTE programs: identify the dates of your most recent advisory group meeting and describe your advisory group's recommendations for your program.

### Response Detail

No Response Information to Display

### Narrative

n/a

### Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

## 3 Looking Back

### 4 Curricular Changes

List any significant changes that have occurred over the prior two years in your program's curricular offerings, scheduling, or mode of delivery. Explain the rationale for these changes.

### Response Detail

No Response Information to Display

### Narrative

1. We did not offered hybrid Chemistry for Health Sciences (CHEM 410) starting in Fall 2016. This course experienced a lower retention and success rate compared to the face-to-face format. Online quizzes were added to create extended student contact during face-to-face sessions and give more schedule flexibility to students. Animations, videos and additional academic resources have been made available to students on webaccess to support their various learning styles.
2. Two day sections of CHEM 410 have been offered since Fall 2016 to accommodate for the removal of the hybrid section. Both sections have filled and had 5-8 waitlists each.
2. We removed Elementary Chemistry (CHEM 192) as a prerequisite for General Chemistry I (CHEM 210) and decreased the number of sections offered. We removed the CHEM 192 prerequisite to eliminate student completion barriers.
3. We increased the number of CHEM 210 sections to accommodate the higher demand due to removal of the CHEM 192 prerequisite. CHEM 210 is a required class for all science majors.
4. An experimental preparatory chemistry course (CHEM 680) was created by Adjunct Instructor Nicholas DeMello in Spring 2016 to accommodate students who might need background preparation before entering CHEM 210. The class was offered in Summer 2016 but had to be cancelled due to low enrollment. The class was not offered during regular semesters.

### Suggested Follow Ups

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No Suggested Follow Ups to Display

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Response Types: All Responses Types

## 5.A. Progress Report - IPC Feedback

Provide your responses to all recommendations received in your last program review cycle.

### Response Detail

No Response Information to Display

### Narrative

Articulation with both CSU and UC is current. The Associate Degree Transfer in Chemistry (ADT Chem) was not pursued. Discussion of chemistry faculty across the District during Flex days led to the conclusion that such degree would not benefit our students at this time. A thorough analysis of the current state of the program is provided in the corresponding section of this report.

### Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

## 5.B. Progress Report - Prior Action Plans

Provide a summary of the progress you have made on the strategic action plans identified in your last program review.

### Response Detail

No Response Information to Display

### Narrative

#### Action Plan

**Chemistry Placement Exam:** Preliminary research was conducted. Sample placement exams from nearby institutions were collected. Discussion with chemistry colleagues across the District took place. We concluded that we did not have sufficient chemistry staff or counseling staff to write policy or to create, administer, collect results and make placement recommendations based on test results. We decided that a more effective use of resources is to maintain constant communication with the Counseling Department.

**Chemistry Preparatory Course:** Examples of comparative courses were analyzed. The course was created and approved by Curriculum Committee as experimental course (CHEM 680). The course was offered in Summer 2016. It was cancelled due to low enrollment. Offering it in Summer of 2017 is being considered.

**Develop HPLC laboratory curriculum:** Professor Tricca and Professor Medina spent several hours trouble shooting the instrument. Professor Medina worked with an honor student to duplicate a literature published experimental protocol. We realized that this sensitive analytical instrument requires routine maintenance. Neither Professor Tricca or Professor Medina can shed sufficient dedicated time from our teaching schedules on a daily basis to have the instrument running as it needs to be incorporated in our laboratory curriculum.

**Develop laboratory curriculum:** We had a Perkin Elmer certified AA technician come free of charge to give a training workshop to the chemistry staff on Flex Day (January 13th, 2017). We are making progress on the creating and testing experiments to be used across the chemistry laboratory curriculum.

**Standardize lab curriculum and procedure for experiment changes:** On-going. A CHEM 210 binder containing laboratory experiments was put together. However, due to the fluidity of the teaching staff and the openness to accept changes of our department, experimental revisions and modifications are continuously taking place. This makes it challenging to manage the laboratory set ups. We need to establish a more formal policy.

### Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

## 6.A. Impact of Resource Allocations

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Describe the impact to-date that new resources (equipment, facilities, research) requested in prior years' program reviews have had on your program. If measurable impacts on student success have been observed, be sure to describe these and include any documentation/evidence. If no resources have been recently requested, please write "not applicable?".

## Response Detail

No Response Information to Display

## Narrative

- a. Spectrum tubes – Used in CHEM 210 atomic structure laboratory unit, currently impacting up to 60 students depending on enrollment.
- b. Geiger counters with kit – has been instrumental on introducing the radioactivity unit to students - currently impacting 120 students a year.
- c. Plasticware sets – are being used in 2 sections of CHEM 410 (62 students) and 2 sections of CHEM 192 (60 students) per semester for students to conduct experiments in a safer manner (minimizing glass breakage risk).
- d. Metal-ware sets - are being used in 2 sections of CHEM 410 (62 students per semester) for students to conduct experiments without the need to have assigned drawers.
- e. Vernier GC are being used in organic chemistry lab as an excellent table top alternative to the more expensive large instrument. They are providing greater student accessibility to instrumentation and eliminated the need to use dangerous pressurized gas tanks.

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

6.B. Impact of Staffing Changes

Describe the impact on your program of any changes in staffing levels (for example, the addition, loss or reassignment of faculty/staff). If no changes have occurred, please write "not applicable".

## Response Detail

No Response Information to Display

## Narrative

n/a

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

**4** Current State of the Program

7 Enrollment Trends

Use the Productivity data packet to examine your enrollments (headcount, FTES, Load) and pattern of course offerings (Productivity by Courses by Semester). How have your enrollments changed? What changes could be implemented, including changes to course scheduling (times/days/duration/delivery mode/number of sections), marketing, and articulation of pathways that might improve these trends? NOTE: If other sources of data are used, please upload these documents or provide URLs.

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Response Types: All Responses Types

## Response Detail

No Response Information to Display

## Narrative

Enrollment in chemistry courses are limited by the size of the laboratory rooms. Safety regulations allow a maximum of 32 students in our existing space. The department productivity trends have been predictable from program changes made in the past two years. Elementary Chemistry, CHEM 192 was converted into a prerequisite for CHEM 210 to be effective in Fall 2014. The number of CHEM 192 sections was increased while the number of CHEM 210 sections was decreased. The CHEM 210 LOAD decreased significantly I Fall 2014 and Spring 2015. Analysis of student retention and success showed no impact of the CHEM 192 as a prerequisite. On the other hand, having an additional prerequisite was creating barriers for student completion. The CHEM 192 prerequisite was reverted to a recommendation in Fall 2015. As a result, the number of CHEM 192 will be reduced and the number of CHEM 210 will be increased. Spring 2016 showed a LOAD improvement (73 head count in 3 sections) for CHEM 210 compared to Spring 2015 (45 head count in 2 sections). We anticipate the head count and the number of sections to increase to our 2013/2014 levels (124 head count in 4 sections).

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

7.A. Connection & Entry - Observation

Observation: Describe trends in program and course enrollments, FTES, LOAD and Fill Rates. Cite quantitative data and identify the specific tables from the data packets. If other sources of data are used, please upload these documents or provide URLs.

## Response Detail

No Response Information to Display

## Narrative

According to the data in the table above, the metrics used to determine productivity (FTES and LOAD) show an acceptable Department productivity. The fill rate has been high (above 86% ) for the last four academic years.

## Suggested Follow Ups

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No Suggested Follow Ups to Display

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Response Types: All Responses Types

## 7.B. Connection & Entry - Evaluation

Evaluation: What changes could be implemented, including changes to course scheduling (times/days/duration/delivery mode/number of sections), marketing, and articulation that may improve these trends in enrollment?

NOTE: If you intend to implement any of these changes, you should create Action Plans in the Planning module of SPOL. Doing so will also allow you to request resources that may be required for successful implementation.

### Response Detail

No Response Information to Display

### Narrative

No changes required at these time

### Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

## 8-A. Access & Completion

One of the goals of the College's Student Equity plan is to close the performance gaps for disproportionately impacted students. The Equity Supplement data packet indicates which groups are experiencing disproportionate impact in your program. Which gaps are most important for improving outcomes in your program? How can the college help you address these gaps? What changes could be made?

### Response Detail

No Response Information to Display

### Narrative

**Analysis of the "Student Characteristics 2014/2015 to 2015/2016" shows higher percent of females enrolled in chemistry classes. The gap went from 14% difference in 2014/2015 to 8% difference in 2015/2016.**

**Regarding "Student Ethnicity by Gender", the data shows that only the White non-Hispanic group shows a higher percent enrollment of females over males (54% versus 44%). All other ethnic groups show gender balance in 2015/2016.**

**Regarding retention and completion in 2015/2016, there was a 4% difference in retention of females and males. There was 3% difference in completion.**

**In terms of retention by ethnicity in 2015/2016, Black-Non-Hispanic showed the lowest retention rate (72.7%) compared to a 90.5% retention for Asian. The Hispanic group showed a 78.3% retention and White Non-Hispanic showed 88.9%. Given the small population size (11 Black Non-Hispanic enrolled in 2015/2016), it is not possible to assess gender disparity, if any, in the rate of retention.**

**In terms of completion by ethnicity in 2015/2016, Hispanic showed the lowest retention rate (63.7%) compared to a 83.9% completion for Asian. The Black Non-Hispanic group showed a 72.7% success and White Non-Hispanic showed 82.6%.**

**The data shows that Hispanic group stay in classes but have difficulty successfully completing the classes. The chemistry faculty already make all students aware of student support services and encourage all students to take advantage of tutoring and workshops.**

**The success and completion rate of students in the chemistry department can be improved if student assistants can be hired to work with instructors during laboratory sessions. It is not possible for one instructor to have dedicated, meaningful and effective individualized interaction with 30-32 students conducting elaborate experiments at the same time while also watching any potential for hazards or safety violations.**

### Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

## 8.A. Progress & Completion -Observation

# Search Standards By User

Source: IPR

Cycle: Instructional Program Review 2016-17

User Name: Lead Faculty, Chemistry

Response Types: All Responses Types

Observation: Describe trends in student success and retention disaggregated by: ethnicity, gender, age, enrollment status, day/evening. Cite quantitative data and identify specific tables from the data packets. If other sources of data are used, please upload these documents or provide URLs.

## Response Detail

No Response Information to Display

## Narrative

Overall retention and success is consistent and within the set goals for the department.

**Retention and Success by ethnicity (Refer to "Success and Retention 2009/10 to 2013/14" data package pages 2-3):**  
Similar patterns of retention and success are observed during this time period. The retention of African-American, Filipino and Hispanic is approximately 10% lower than the retention of White. The difference is not really statistically significant due to the small sample size. For example, the retention of Native American is 100% in 2011-2102 but drops to 75% in 2012-2013. The sample size remained a three students in each case. Asian have a higher retention rate than White. The rate of success is lower than the rate of retention for all ethnicities, except for Asian and White in some years.

**Retention and success by gender (Refer to "Success and Retention 2009/10 to 2013/14" data package pages 3):**  
The retention rate has been approximately constant at around 85% ± 3% from 2009 to 2014 for both female and male. Males are retained at a marginally higher percentage, except in 2014 when males were retained 8% higher than females. The success of females and males was between 5% and 8% lower than their respective retention rates.

**Retention and success by age (Refer to "Success and Retention 2009/10 to 2013/14" data package pages 4-5):**  
The largest group of students fall in the 18-22 category with a consistent 79-85% retention and a consistent success of about 7% lower. The under 18 group is only about 50 students with a high percent (over 90%) retention and high percent (over 90%) success.

**Retention and success by enrollment status (Refer to "Success and Retention 2009/10 to 2013/14" data package pages 5-6):**  
Continuing students make up the largest group with a retention of approximately 80% and a success of approximately 73%. The percentage of first-time students and first-time transfer students is low. Their retention and success is high but varies from year to year.

**Retention and success by Day/Evening (Refer to "Success and Retention 2009/10 to 2013/14" data package page 6):**

There is a significant difference between the performance of the day classes and the evening classes. Day sections have consistently higher retention and success

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

8-B. Completion - Success Online

The college has a goal of improving success in online courses. Examine the "Course Success and Retention by DE vs Non DE" data table in the "Effectiveness: Success and Retention" data packet. What significant gaps do you see in success between online/hybrid and non-online courses? What changes could be made to reduce these gaps? If your program does not offer online/hybrid courses, please write "not applicable".



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Response Types: All Responses Types

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## Response Detail

No Response Information to Display

## Narrative

All chemistry courses offered by the college have a laboratory component. This laboratory component is essential for the students to acquire the necessary technical skills and safety protocols to apply chemical concepts to the workforce environment. Because of this, the most appropriate distance education form of delivery is hybrid/web assisted. Students taking chemistry traditionally need a lot of academic support that can only be received on face-to-face classes. However, we understand the need to make courses accessible to students who might not be able to come to campus. To this end, a hand full of distance education courses have been offered.

Term Delivery Head count Retention rate Success rate

2014/2015 DE 47 72.3% 71.4

2014/2015 Non DE 595 86.4% 78.8%

2015/2016 DE 30 90.0% 83.3%

2015/2016 Non DE 687 85.7% 77.6%

Analysis of the data in the table above, the department has shown significant improvement in both retention and success of students who take DE courses in the year 2015/2016 compared to the previous year. This is the result of online resources posted on Webaccess and working closely together with the Learning Center to increase the number of chemistry tutors available. Comparison between DE and Non-DE is less relevant given the large difference in the number of students served.

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

8.B. Progress & Completion Online - Observation

Observation: For online courses describe any significant differences in the success and retention of students who are taking online courses compared to face-to-face courses

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## Response Detail

No Response Information to Display

## Narrative

Distance education courses are fairly new to the chemistry department. The data shows that the greater the degree of personal contact the higher the rate of retention and success.

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

8.C. Progress & Completion - Evaluation

Evaluation: Based on these trends, what do you feel are significant factors or barriers influencing student success in your courses and program? What changes (e.g. in curriculum, pedagogy, scheduling, modality) could be implemented to improve these trends?

NOTE: If you intend to implement any of these changes, you should create Action Plans in the Planning module of SPOL. Doing so will also allow you to request resources that may be required for successful implementation.

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## Response Detail

No Response Information to Display

## Narrative

The most significant findings come from the Day/Evening data and the distance education data. Evening students come from a long day of work to a 3 hour laboratory session. It is challenging to stay focused for that many hours. However, it is not convenient for students who work during the day to come to campus more than once a week for shorter periods of time. Regarding distance education, it is evident that face-to-face contact is crucial. Chemistry works on abstract concepts challenging to grasp for students on their own. Changes might include an extended student support system such as EPIC leaders in the evening. These students can help evening students get connected with other resources on campus. Regarding distance education, trying a hybrid day section instead of a hybrid evening section might be a plausible alternative to students.

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

9.A. SLO Assessment - Compliance

Are all active courses being systematically assessed over a 3-year cycle? Describe the coordination of SLO assessment across sections and over time.

## Response Detail

No Response Information to Display

## Narrative

Yes. Every semester a decision is made regarding which SLO to evaluate. Fulltime and adjunct faculty teaching the various courses collect the agreed upon data. The data is submitted to Jeanette Medina who inputs it in tracdat.

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

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Response Types: All Responses Types

9.B. SLO Assessment - Impact

Summarize the dialogue that has resulted from these course SLO assessments. What specific strategies have you implemented, or plan to implement, based upon the results of your SLO assessment? Cite specific examples.

## Response Detail

No Response Information to Display

## Narrative

Conversations about SLO results pointed out the need to give students additional practice opportunities in certain laboratory techniques. A titration virtual lab is now performed before having students perform a live titration lab. Analysis of CHEM 192 SLO results indicated that students had a difficult time understanding the particulate nature of matter, a concept that is crucial to understand chemistry. A University of Colorado PHet Interactive animation about states of matter is now shown to students early in the semester. Students have shown a better understanding of chemical concepts. Analysis of CHEM 210 data indicated that students have difficulty decoding relevant information from word problems, connecting number meaning to physical meaning, and applying chemical concepts to related situations without seeing an example before. Analysis of CHEM 410 data indicates that students have difficulty with nomenclature. A manipulative is being developed to be used as a puzzle to help students put ions together. Also, a laboratory session is now devoted to practice, independently and in group setting, putting ionic compounds together and to name a variety of ionic and covalent compounds. Analysis of eth CHEM 231 data showed students have difficulty drawing reaction mechanisms. As a result, a new flipped classroom teaching mode is being implemented. There is an assigned reading in preparation for lecture. During lecture students work on sample problems in small groups. The instructor circulates to support students.

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

10 PLO Assessment

Describe your program's Program Learning Outcomes assessment plan. Summarize the major findings of your PLO assessments. What are some improvements that have been, or can be, implemented as a result of PLO assessment?

## Response Detail

No Response Information to Display

## Narrative

Only 1-3 students complete a Chemistry major. Most Physical Science majors (either Chemistry or Physics) take Physics in their last semester at Canada. The direct method to assess PLOs in Chemistry is a capstone project in the second semester of organic chemistry. In this project, each student is given two unknowns. Each unknown is fully identified using chemical and analytical instrumentation methods. Students submit a concise report to justify their sample identification. Students have been successful in completing this project. Thus demonstrating proficiency in the three Physical Sciences Program Student Learning Outcomes.

This project requires a great deal of preparation time and student support during the 2-3 weeks duration of the project. It also requires chemicals and supplies. We could use staff help and dedicated budget to support the project.

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

10.A. PLO Assessment - Plan

Describe your program's Program Learning Outcomes assessment plan. Please specify whether you are using direct or indirect measurements of assessment.

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Response Types: All Responses Types

## Response Detail

No Response Information to Display

## Narrative

PLO assessment is discussed every semester as a flex day activity involving Physical Sciences faculty. We choose a PLO to be assessed per year. We discuss the means of assessment to be used depending on the PLO to be assessed. A typical direct assessment method is a laboratory report where students can demonstrate the use of the scientific method; their ability to effectively communicate scientific information; and the ability to critically analyze data. Results of PLO assessment have helped us identify areas of improvement in technical report writing. Students are given examples of the sections to include in a laboratory report. Explanation of the format and content of each section is also given.

## Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

10.B. PLO Assessment - Impact

Describe your program's Program Learning Outcomes assessment plan and summarize the major findings of your assessments. What are some improvements that have been, or can be, implemented as a result of PLO assessment?

## Response Detail

No Response Information to Display

## Narrative

Students were unclear on the meaning of technical writing. Students were unable to produce conclusions justified by experimental evidence. Examples of well-written laboratory reports are now given to students. A laboratory report guidelines document is available to students. Students participate on a workshop on how to write an appropriate lab report in organic chemistry.

## Suggested Follow Ups

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## 5 Looking Ahead

### 11 Program Planning

Construct Planning Objectives (through the Associated Planning Objectives field below) that describe your plans for program improvement over the upcoming two-years. As you write your objectives, be sure to explain how they address any opportunities for improvement that you identified throughout this Program Review. Add Action Plans and Resource Requests for any research, training, equipment or facilities improvements that will be needed in order to achieve your objectives.

#### Response Detail

No Response Information to Display

#### Narrative

There is no Narrative Entered.

#### Suggested Follow Ups

Date	Suggested Follow Up
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No Suggested Follow Ups to Display

### 12 Personnel Projections

Describe your recent history requesting new faculty/staff positions. List the current and near-future new or replacement faculty/staff positions that you anticipate requesting. Identify the term or year in which you anticipate submitting the staffing request. If none are anticipated, please write "not applicable". (List only; no justification needed here.)

#### Response Detail

No Response Information to Display

#### Narrative

There is no Narrative Entered.

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No Suggested Follow Ups to Display