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| **Assurance of Student Learning Report****2023-2024** |
| Ogden College of Science and Engineering | Department of Chemistry and Department of Biology |
| Biochemistry, Ref. 519 |
| Kevin M. Williams, Professor and Chair, Department of Chemistry |
| ***Is this an online program***? [ ]  Yes [x]  No | Please make sure the Program Learning Outcomes listed match those in CourseLeaf . Indicate verification here [x]  Yes, they match! (If they don’t match, explain on this page under **Assessment Cycle)** |

**\*\*\* Please include Curriculum Map as part of this document (at the end), NOT as a separate file.**

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| ***Use this page to list learning outcomes, measurements, and summarize results for your program. Detailed information must be completed in the subsequent pages. Add more Outcomes as needed.*** |
| **Program Student Learning Outcome 1: Communicate effectively in written form** |
| **Instrument 1** | **Assessment of protein paper in CHEM 447 (Biochemistry laboratory)** |
| **Based on your results, check whether the program met the goal Student Learning Outcome 1.** | **[x]  Met** | **[ ]  Not Met** |
| **Program Student Learning Outcome 2: Interpret and explain data about chemical systems** |
| **Instrument 1** | **American Chemical Society Exam in Analytical Chemistry** |
| **Based on your results, check whether the program met the goal Student Learning Outcome 2.** | **[x]  Met** | **[ ]  Not Met** |
| **Program Student Learning Outcome 3: Describe and discuss structure-property-function relationships for a variety of molecules** |
| **Instrument 1** | **American Chemical Society Exam in Organic Chemistry** |
| **Based on your results, check whether the program met the goal Student Learning Outcome 3.** | **[ ]  Met** | **[x]  Not Met** |
| **Assessment Cycle Plan:**  |
| We plan to continue to assess the above program learning outcomes in the upcoming year in order to examine trends in student performance. Due to staffing changes in the program, we have new faculty teaching in key courses (330, 446, 447) and thus we wish to collect additional data with existing learning outcomes. |

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| **Program Student Learning Outcome 1** |
| **Program Student Learning Outcome**  | Communicate Effectively in Written Form |
| **Measurement Instrument 1**  | **Assessment of protein paper**In biochemistry laboratory, students chose a protein and investigated the structural details and the function of the protein in the scientific literature. Each student then wrote a paper explaining how the structure of the protein contributes directly to its function. The papers were scored on a scale of 1 to 4 using the AACU Written Communication rubric using the 5 categories of the rubric. In the fall, 13 biochemistry majors submitted papers and all 13 were assessed by the rubric. |
| **Criteria for Student Success** | The papers should score an average of 2.6 on the 4-point scale of the Written Communication Rubric |
| **Program Success Target for this Measurement** | At least 75% of the papers will score at least an average of 2.6. | **Percent of Program Achieving Target** | 92% (12 out of 13) |
| **Methods**  | The papers were evaluated using the Written Communication VALUE rubric by Dr. Kevin Williams. A score of 1 (benchmark) to 4 (capstone) was assigned for each category and the values were averaged. The papers had averages that ranged from 2.4 to 3.2. |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** |
| **Results**: The percentage of students scoring 2.6 or higher was well above our target. Our range of scores is relatively narrow and reasonably close to the target range. Two different faculty taught the biochemistry laboratory this fall semester with the majors roughly equally distributed.**Conclusions**: Students who are in the biochemistry laboratory course generally demonstrate the ability to communicate in written form.**Plans for Next Assessment Cycle**: We will continue to use this metric in future assessment cycles since the faculty rotation of the biochemistry teaching lab continues to vary across several faculty.  |

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| **Program Student Learning Outcome 2** |
| **Program Student Learning Outcome**  | Interpret and explain data about chemical systems |
| **Measurement Instrument 1** | **American Chemical Society Exam in Analytical Chemistry**This is a nationally-normed 50-question multiple choice exam given at the conclusion of the CHEM 330 (Quantitative Analysis) course (required of all majors and minors).  |
| **Criteria for Student Success** | 50%-tile ranking or higher |
| **Program Success Target for this Measurement** | 50% of students taking the exam | **Percent of Program Achieving Target** | 60% |
| **Methods**  | Assessment was given to all students in the course. |
| **Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 2.** | **[x]  Met** | **[ ]  Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** |
| **Results**: The percentage of students achieving the target percentile of content mastery over the last three AY’s is: 73% AY 21/22, 54% AY 22/23 and 60% AY23/24. The course is a sophomore/junior-level course. However, we are seeing more student delaying the course until their senior year. As a result, some students have difficulty in recalling information and material covered in the freshman-level courses (121 and 222).**Conclusions**: With the retirement of a long-standing faculty member, a new faculty member was charged with teaching the course during AY 23/24. The new faculty member introduced several new laboratories to rejuventate this lab aspect of the course. It is too early to know if changes in the course will lead to students opting to take the course earlier in the academic career.**Plans for Next Assessment Cycle**: Review-type exercises at the beginning of the course may be used so that students can identify their content weaknesses and review tose areas early in the course. Additionally, instructors in the freshman-level courses and advisors will be asked to encourage students to take the course earlier in theor academic careers.  |

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| **Program Student Learning Outcome 3** |
| **Program Student Learning Outcome**  | **Describe and discuss structure-property-function relationships for a variety of molecules** |
| **Measurement Instrument 1** | **American Chemical Society Exam in Organic Chemistry**This is a nationally-normed 50-question multiple choice exam given at the conclusion of the CHEM 342 (Organic Chemistry 2) course. |
| **Criteria for Student Success** | 50%-tile ranking of higher |
| **Program Success Target for this Measurement** | 50% of students taking the exam | **Percent of Program Achieving Target** | 26% |
| **Methods**  | Assessment was taken by all students in the course. |
| **Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 3.** | **[ ]  Met** | **[x]  Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** |
| **Results**: The percentage of students achieving the target percentile of content mastery over the last three AY’s is: 39% AY 21/22, 46% AY 22/23 and 26% AY23/24. The course is a sophomore/junior-level course. However, we are seeing more student delaying the course until their senior year. As a result, some students have difficulty in recalling information and material covered in the freshman-level courses (121 and 222).**Conclusions**: It was proposed that the low percentages of students achieving the target percentile of content mastery was a fuction of the students’ lack of mastery of content material from previous coursework and the use of online instruction during the pandemic, and the return to in-person learning would lead to a higher percentage of students achieving mastery of the content as reflected by the increase from AY 21/22 to AY 22/23. The current drop in student performance is not easily explained. There have been no major changes in content coverage, textbook, ancillary materials or testing from previous cycles.**Plans for Next Assessment Cycle**: The faculty in charge of the CHEM 340 and 342 Organc Chemistry sequence will meet at the beginning of the Fall semester to discuss the implementation of interventions, such as use of review exercises, faculty/student-lead review sessions and introduction of online homework. |

