2024-2025

ANNUAL ASSESSMENT REPORT

Chemistry Minor

CARRIE MCCRAY

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2024-2025 Assessment Narrative on Findings

Chemistry Minor

Mission and Introduction

Introduction

1. Provide an overview of the program and the context of where it's housed within the institution (what department, etc.).

Narrative:

The Chemistry Minor at William Woods University is designed to provide students with some foundational understanding of chemical principles and laboratory techniques. Due to the university not having Chemistry as a major, there are five courses' students must take in order to receive their minor. They will take two semesters of General Chemistry, two semesters of Organic Chemistry and one semester of Biochemistry. All these courses include the following labs. 5 classes total making it 20 credits for the minor. Students will gain practical laboratory experience and develop critical thinking and problem-solving skills related to chemical processes and scientific inquiry. The Chemistry minor is part of the School of Natural Sciences and Mathematics and this minor usually is in pair with different majors such as Biology, Exercise Science, or Equestrian Studies.

Program Mission Statement

1. What changes has the program made to the mission statement over the course of this cycle? Why were these changes made? Are any revisions planned?

Narrative:

There have not been any changes to the minor mission statement. No changes were made, and it is aligned to the university mission.

Alignment to Institution Mission

1. How does the mission of the program align with the mission of the institution?

Narrative:

The mission of the program aligns with the mission of the institution in various ways:

1) The student-centered learning environment is important because the chemistry minor emphasizes foundation understanding, critical thinking, and practical applications. Due to having smaller class sizes and hands-on experiments, the program ensures that students will receive the individual attention, which aligns with the university's commitment to personalized learning.

2) Both the missions highlight an emphasizes of intellectual inquiry. The minor aims to inspire a passion for scientific inquiry, which mimics the university's broader goal of encouraging curiosity.

3) Values of inclusion and creativity is vital, while chemistry is a structured science, the minor encourages creativity in problem-solving along with experimentation. Additionally, it supports inclusion by being accessible and relevant to a variety of majors. This enables students from a diverse background to engage with scientific learning. This minor reinforces the institution's mission by building a flexible learning experience that helps students to think critically and solve problems.

Student Learning Outcomes Assessment and Curriculum

Program Student Learning Outcomes

1. Describe how these outcomes pertain to the program's mission. Have any changes been made to these outcomes over the course of this cycle? Why or why not?
2. Describe the extent to which students in the program have met these outcomes.

Narrative:

Program Objective 2: Demonstrate a thorough understanding of the periodic table of elements and how it can be used to determine trends in chemical reactivity and stability.

Program Objective 3: Logically apply the scientific method to everyday situations in order to facilitate an understanding of the world around us.

Program Objective 4: Integrate empirical evidence with experimental data, such that solid conclusions can be formulated.

1. Describe how these outcomes pertain to the program's mission. Have any changes been made to these outcomes over the course of this cycle? Why or why not?

Under Objective 2: Understanding the Periodic Table and Trends in Reactivity and Stability: This objective aligns with the mission's emphasis on foundational chemical principles. Having a thorough understanding of the periodic table is key to chemistry education and serves as a critical took for predicting and explaining chemical behavior.

Under Objective 3: Application of Scientific Method to Real-World Situations: This outcome directly supports the mission's aim to inspire a passion for scientific inquiry. By applying the scientific method outside the classroom, students learn to evaluate everyday phenomena building curiosity and critical thinking.

Under Objective 4: Integration of Empirical Evidence with Experimental Data: This objective reinforces the mission's focus on developing problem-solving skills through evidence-based reasoning. This helps support the university's emphasis on intellectual inquiry and professional preparation.

2. Describe the extent to which students in the program have met these outcomes.
For General Chemistry:

Program Objective 2, 3 and 4:
1) 26/27 MET the goals of the ability to understand quantitative information; this includes the skills to interpret figures, tables, mathematical models, and any other form of communication of quantifiable data.
2) 27/27 MET the goals of understands the process of nature of science as a progressive body of knowledge through the interpretation and application of credible scientific principles, statements, and experimental results.

For Organic Chemistry:
1) 9/9 MET the goals of the ability to understand quantitative information; this includes the skills to interpret figures, tables, mathematical models, and any other form of communication of quantifiable data.
2) 9/9 MET the goals of understands the process of nature of science as a progressive body of knowledge through the interpretation and application of credible scientific principles, statements, and experimental results.

Program Objective 1 will be MET this fall.

Evidence:

- Chemistry Minor_2024-2025 Curriculum and Assessment Findings_2024-2025

Curriculum Map

1. Describe the course pathway students take to achieve this program degree. Highlighting any key or core courses, have any changes been made to this pathway or degree requirements over the course of this cycle? Why or why not?

Narrative:

The course pathway is built from basic to advanced topics, ensuring students develop both a conceptual understanding and practical laboratory skills.

1) General Chemistry I with Lab (CHM 114/115)
-This is the first semester of chemistry and covers atomic structure, stoichiometry, chemical bonding, gas laws, thermodynamics, and the theory about the periodic table.
-We will do basic lab techniques and follow safety rules.
-Supports Program Objective 1,2,3 and 4.

2) General Chemistry II with Lab (CHM 124/125)
-Expands on concepts from Gen Chem I with new topics such as thermodynamics, equilibrium, acid-base chemistry, and kinetics.
-Introduces more complex data analysis and experimental procedures.
-Supports Objectives 2 and 4

3) Organic Chemistry I with Lab (CHM 314/315)
-Focuses on carbon-based molecules, functional groups, reaction mechanisms, and different types of syntheses.
-Experiments emphasize identification and understanding different types of laboratory techniques such as melting points, recrystallization, or chromatography.
-Supports Objectives 2,3, and 4

3) Organic Chemistry II with Lab (CHM 324/325)
-Continuation of Organic Chem I, focuses on aromatic hydrocarbons, NMR, IR, Amine, Carboxylic Acids, and its Derivatives.
-Focus more on synthesis reactions and applications of instrumental techniques.
-Supports Objectives 2,3, and 4

No major changes have been made to the core pathway due to assessment data, and the minor is flexible to students in biology, equestrian studies and exercise science.

Measures and Results

1. Discuss the measures you've selected or developed to measure this outcome. Why were these measures chosen? Were any measures or assessment instruments changed over the course of this cycle? Why or why not? Will different measures be chosen the next time this outcome is assessed?
2. Summarize and discuss the results of the program's measures over the course of this cycle. Have the results demonstrated improvement or mastery of this outcome? Why or why not?

Narrative:

1. Measures:
1) Analysis of Chemistry Blog: This is a direct lab assignment where students will read a paper and it helps explain program objective 1 : Demonstrate a fundamental understanding of chemical concepts relating to all branches of chemistry, including analytical, organic, physical, inorganic, and biochemistry.
2) Periodic Behavior of Metals: This is an experiment that will have students learn how to graph and analyze data based off the periodic table. This helps explain program objectives 2,3, and 4.

Both these measures were chosen because they best are aligned with the program objectives. These will be used for the future as well.

Measure 1 was added recently, because there was program objective 1 that still needed to be covered.

2. This is the first time these measures were use and majority of the students MET the expectations. These assignments clearly help students achieve understanding all the program objectives. Most students once they take the last semester of Chemistry have improved or have a very clear understanding of the four program objectives. The two measures will be used, and more data will be collected to see if these two are appropriate for the chemistry minor.

Evidence:

- Chemistry Minor_2024-2025 Curriculum and Assessment Findings_2024-2025

Participation in Assessment

1. How do program faculty participate in assessment? What is the process? Have any changes been made to encourage participation over the course of this cycle?

Narrative:

The faculty will engage in several activities such as defining learning program objectives and developing assessment tools.

For the assessment process for the chemistry minor, it is important to follow the following steps:
1) Planning: The faculty will determine the learning outcomes.
2) Implementation: There are assessments given for the courses.
3) Evaluation: Students performance will be evaluated and there will be a set score percentage the students must aim for such as 70% or higher.
4) Documentation: The assessment is documented, and the information will be saved for the institution.

No major changes have been made to encourage participation.

Action Items and Use of Results

1. Summarize or highlight action items taken as a result of program's assessment results. How have the results driven improvement over the course of this cycle?

Narrative:

This was the first year on these measures. The measures were created in order to align with the chemistry minor objectives and the university's mission statement. The results shown that from all the classes that 90% for every class were MET which was above the anticipated target. Due to the percentage being higher, no actions need to be performed.

The goal of these program assessments is to enhance student performance in the lab and learn how to structurally write a paper in the future.

Evidence:

- Chemistry Minor_2024-2025 Curriculum and Assessment Findings_2024-2025

Gen Ed

1. What courses in your program are tied to general education requirements at the institution? How many students from outside the department are taking courses in the program to fulfill gen ed requirements?

Graduate Programs please note NA in this section as it does not apply to your program.

Narrative:

The only course that ties in as a Gen ED is General Chemistry I-Chem 114/115.

2 students majoring Secondary Education and the rest of the students were either Exercise Science or Biology.

NSSE Focused Activities

In the Spring of 2024, the faculty voted on the following NSSE objectives for focus.

2B - Connected your learning to societal problems or issues.
2F - Learned something that changed the way you understand an issue or concept.
9A - Identified Key information from reading assignments.
6A - Reached conclusions based on your own analysis of numerical information (numbers, graphs statistics, ...)

How has your program incorporated these learning objectives into the program curriculum?

Graduate Programs please note NA in this section as it does not apply to your program.

Narrative:

2B: Courses in the minor such as General Chemistry and Organic Chemistry incorporated discussions on the application of chemical principles to real-world societal issues. An example would be environmental concerns which allows students to understand the relevance of chemistry in addressing challenges.

2F: The program has experiential learning through labs that help understand a concept. We learn something in lecture, and then do an experiment where students are able to see that concept in a real-world application. Engaging students with hands-on experiments and analyze results helps them deepen their understanding of these concepts.

9A-Chemistry courses require students to engage with the e-textbook provided for them. Some assignments are designed to develop critical reading skills which enables students to extract and synthesize key information effectively.

6A- One of the program measures helped covered this because the students collected data and had to analyze and graph it on excel. They learned how to properly make scatter plots and learn what the slopes mean.

Concentrations

Concentration Information

Please list the concentrations that relate to your program. If you do not have any Concentrations, please note N/A in the text box.

Narrative:

N/A- the chemistry minor does not currently offer any formal concentrations.

Faculty Qualifications, Activities and Scholarship

Scholarship and Research

1. Summarize and highlight key scholarship and research activities conducted by faculty over the course of the review cycle.

Narrative:

N/A- this has not been done yet. I am hoping to try something like this in the future, but for now, no research has been conducted.

Faculty Awards and Honors

1. Discuss and highlight awards and honors received by faculty over the course of the cycle.

Narrative:

No honors or awards have been received yet.

Teaching Support and Monitoring Teaching Quality

1. How are faculty being supported to ensure high quality teaching and learning?

Narrative:

The faculty are well-equipped to deliver high-quality, student-centered instruction that aligns with both program and institutional goals.

The faculty have access to professional development opportunities.

The university helps promote a culture of teaching excellence and recognizes faculty achievements through different awards and public acknowledgement. Smaller class sizes help enable faculty to focus on individualized instruction and build relationships which helps create a deeper student engagement.

Program Data: Student Experience

Enrollment and Recruitment

1. What are the trends with enrollment in this program over the course of the review cycle? How does this compare to institutional trends or similar programs on campus?
2. Describe recruitment efforts or goals such as increased enrollment or diversity. Have these initiatives been successful?

Narrative:

Fall of 21: 20
Fall of 22: 21
Fall of 23: 25
Fall of 24: 15

We can clearly see that over the past years; the enrollment has decreased. The goal is that more students take it as a GE and this will get the enrollment numbers up.

Biology faculty members and I are doing a great job of trying to convince students to get a chemistry minor so that it can increase the overall enrollment.

Retention

1. Has student retention remained in an acceptable range over the course of the review cycle?
2. Discuss strategies or actions that the program is doing to impact student retention within the program?

Narrative:

Fall of 2024 had a major decrease from previous year of 25 to now 15. We can expect that since the enrollment numbers for the university are increasing that more students will be taking chemistry courses. I would say besides that one year, the data from Fall of 2021-Fall of 2024, it has been in the acceptable range.

If the GE Chem I course can be a fun and exciting course, this can have students want to take another year of it. The courses are challenging already but trying to incorporate fun experiments and projects could interest students more in science.

Curriculum/Course Retention and Success

1. Describe enrollment trends in the courses within the program.
2. Reflect on the success of the students within the courses over the course of the cycle. Highlight some completion or DFW rates in the core courses. Were these in line with expectations?
3. Assess student performance and success in online vs. on-campus courses.

Narrative:

As previous stated here is the data:

Fall 21: 20
Fall 22: 21
Fall 23: 25
Fall 24: 15

1. We had a decrease in Fall 24 but with more students coming to campus this gives the opportunity to increase the enrollment.

2. All the students have passed all the courses since I have started. Students have worked extremely hard since the courses are challenging, but every student has successful finished their chemistry minor since I have started in Spring 24. There were two people who dropped the course in Fall of 24, I

am unsure if those were W's at the time since it was way later in the semester. These students struggled throughout the semester and were most likely going to receive a D. In the three semesters taught, only 2 D's were received.

3. These chemistry courses are on-ground and in person. There is no need to assess the student performance of online vs on-campus chemistry courses.

Completion

1. How many students are graduating from the program? Have the completion rates been in line with expectations?
2. Describe findings resulting from exit surveys or program alumni surveys that were conducted over the course of the cycle.

Narrative:

This is a chemistry minor not a chemistry major. I am unsure where the data is to see if they completed their chemistry minor. From the past three semesters I can say, there will be 14 students who will have their chemistry minor completed since I have started in Spring 24.

Due to not being a major, we do not do any EXIT surveys.

Course Evaluation Data

1. What were some positive and negative feedback received from students who completed the courses? Highlight any trends or insights that came from course evaluations over the course of the cycle.

Narrative:

Positive Feedback: Major of the students mentioned the availability that they are helped when it comes to content and labs have been extremely helpful. Additionally, they realize the time I put in for students to make sure they learn material is also noted and they mentioned they have a lot of resources to be successful.

Negative Feedback: Sometimes I come off as rude and they are afraid to ask questions.

Majority of the feedback has always been positive. Students realize I have spent numerous hours to help them and will be able to help them via email or in person.

Student Advising

1. What advising mechanism is in place for the student?

Narrative:

I will start advising students in Fall 25, so I have no additional comments in regard to advising.

Student Awards and Achievements

1. Highlight the accomplishments and external honors received by students in the program over the course of this cycle.

Narrative:

The chemistry minor has no particular accomplishment, besides the students earning their minor.

Program Analysis

SWOT Analysis

1. Strengths, Weaknesses, Opportunities, and Threats.

Narrative:

1) Strengths
1. Having Strong Faculty Engagement: Faculty are involved in assessment, curriculum development, and continuous improvement based on the student data.
2. Hands-on Lab Experience: Students will improve their practice skulls and scientific understanding in the labs.
3. Flexible Course Design: The minor complements many majors such as Biology, Exercise Science and Education. This can make it more open to non-chemistry majors.

2) Weaknesses
1. Low Awareness: there is evidence that students in relevant majors are sometimes unaware how this minor can be beneficial to their career.
2. Limited Course Offering: As a minor, the program does not have many upper-division courses where students can learn more specialized content.

3) Opportunities
1. Hybrid Labs: Incorporating virtual labs can increase accessibility.
2. Interdisciplinary Collaboration: Linking with public heath, environmental, or forensic science could expand the minors relevance.

4) Threats
1. Competition from Other Institutions: Nearby schools may offer stronger chemistry programs and draw potential students away.
2) Budget Constraints: Lab equipment may be limited affecting the ability to expand.

Industry and Program Trends

Senior Exit Surveys

1. What were some positive and negative feedback received from students as they complete their degrees? Highlight any trends or insights that came from exit surveys over the course of the cycle.

Narrative:

No exit surveys were given for the chemistry minor.

Recommendations from Previous Annual Assessment Reports

1. Summarize Action Items, goals from the program that were listed in the previous Annual Assessment report, describe how/if those recommendations were applied this year.

Narrative:

There was no previous report.