

Report of Student Learning and Achievement
Concordia University Irvine
School of Arts and Sciences – Biology, Chemistry, and Biochemistry Program

For Academic Year:	2025-2026
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School of Arts and Sciences Mission
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Biology, Chemistry, and Biochemistry Program Purpose

The School of Arts & Sciences fosters the virtues of curiosity, courage, and humility in our students, thereby preparing them for their vocations in service to others. This is accomplished within the Lutheran liberal arts tradition by engaging with many enduring questions while relying upon the truth found in Jesus Christ.

The School of Arts and Sciences teaches a majority of the Q&I general education offerings of the university and monitors the courses, majors, minors, and professional programs through its different departments for the purpose of developing "wise, honorable, and cultivated citizens" in a variety of fields of study.

The Biology, Chemistry and Biochemistry Department strives to develop wise and honorable citizens capable of excelling as witnesses of Christ and in their vocations within the biological and physical sciences or elsewhere.

Graduates with a Bachelor's degree in biology will be able to articulate their understanding of the natural world, address pressing social and scientific challenges from a Christian perspective, and continue to recognize their worldviews in order to gain the ability to confidently approach, analyze, and solve academic, social, and theological challenges with which students improve their understanding of the natural world, their own faith, and their role in society.

The study of Chemistry and Biochemistry endeavors to develop students who possess high-level numerical, computational, experimental, and analytical abilities seeking to prepare students to formulate, investigate, analyze and articulate solutions to major scientific, technological, environmental, and health problems in the natural sciences. In concert with the Great Commission, the study of physical sciences embraces the idea that its curricula should actively encourage and prepare students to develop theologically sound and scientifically solid connections between the Christian faith and the discipline.

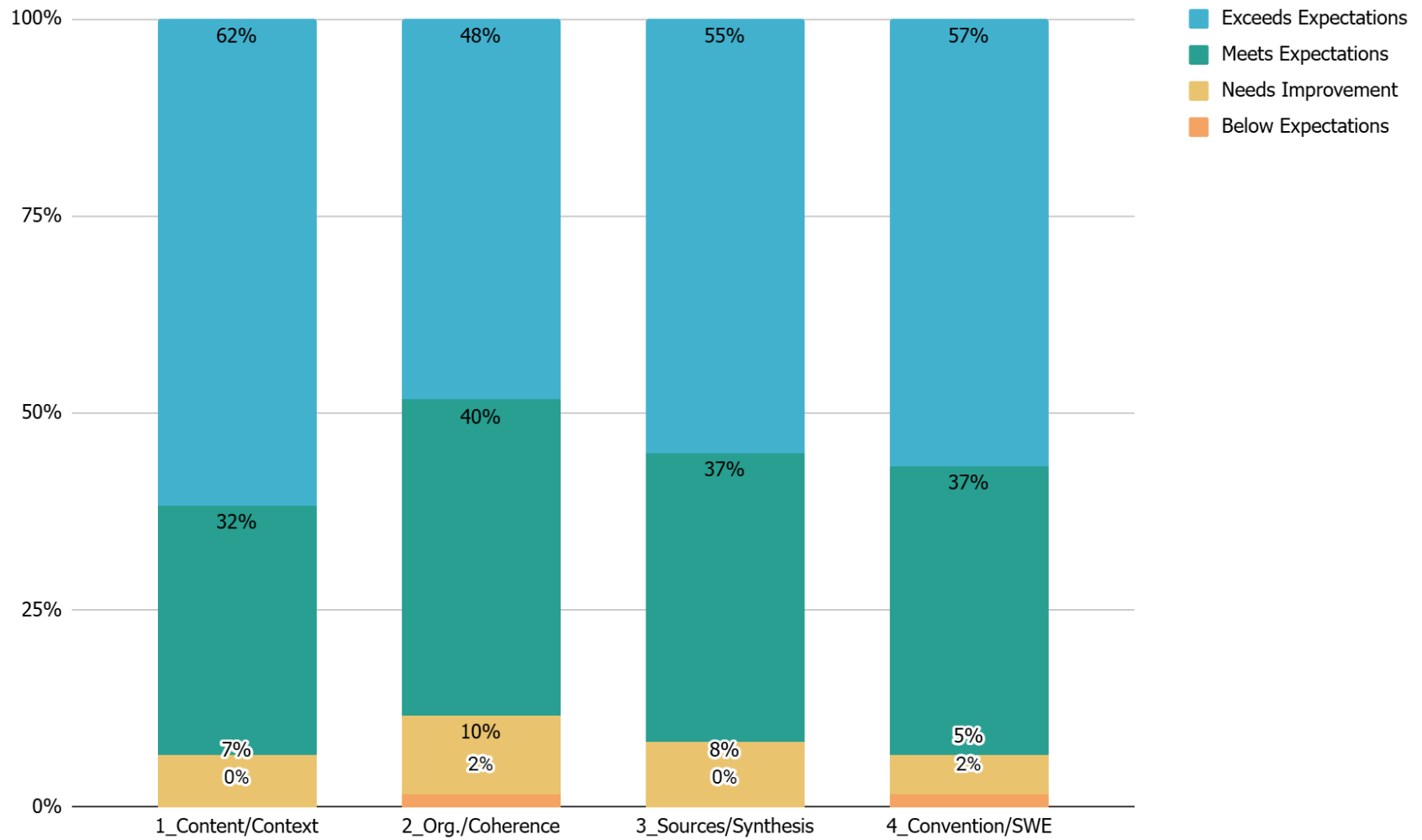
The Biochemistry major will engage students at the interface of chemistry and biology. Students will apply the principles learned in chemistry to how biology works in the cell and at the organism level. Students will be able to specialize in different areas of biochemistry by choosing electives that are in line with their future goals.

Program Learning Outcomes (PLOs)
Biology Major
1. Demonstrate competency in written and oral communication.
2. Demonstrate competency of content in genetics and cell, molecular, and organismal biology.
3. Apply appropriate mathematical and statistical analysis to data.
4. Read, analyze, and critique primary scientific literature.
5. Demonstrate competency in basic scientific laboratory techniques.
6. Articulate a Christian worldview from a Lutheran perspective on various scientific topics.
Chemistry and Biochemistry Majors
1. Chemical Knowledge: Describe and utilize key facts and concepts in chemistry.
2. Literature Awareness: Read and critique peer-reviewed scientific literature.
3. Scientific Method: Apply scientific methods to investigate, formulate, analyze, and solve problems involving chemistry.
4. Problem Solving: Articulate and validate strategies and processes necessary to solve numerical and logical problems.
5. Chemistry Writing: Construct a written cogent and logical scientific argument that adheres to an appropriate scientific style.
6. Articulate Chemistry Concepts: Use multiple tools (e.g., graphs, numerical data, and mathematical/symbolic notation) to represent chemical ideas.
7. Chemistry Presentation: Give a succinct oral presentation on a topic in chemistry.
8. Faith-Science Integration: Identify and develop theologically sound and scientifically rigorous connections between the Christian faith and chemistry.
9. Community Service: Collaborate on chemistry-themed community service projects.

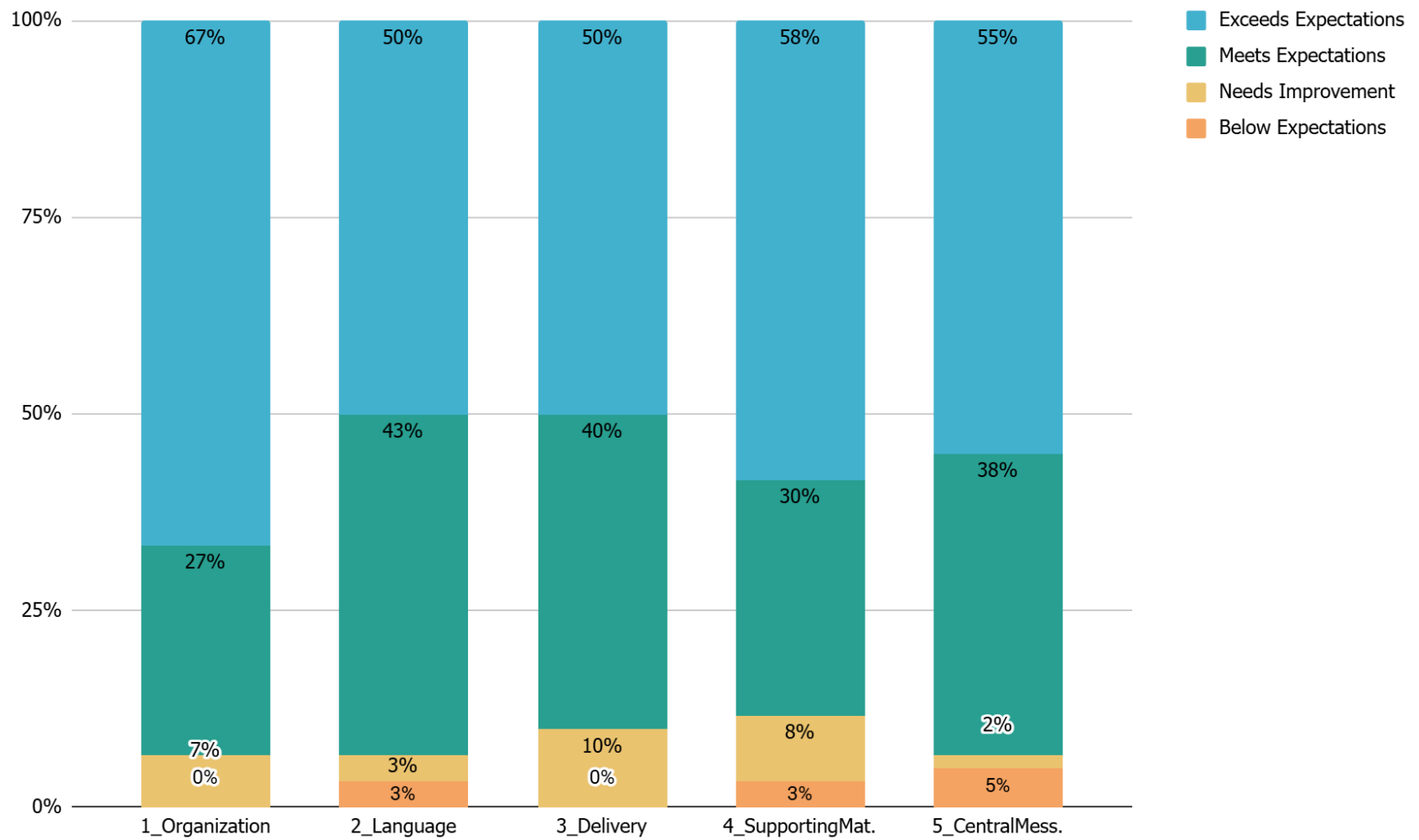
Program Assessment Overview			
Aligns with ULO: Written Communication / Oral Communication			
PLOs Assessed	Evidence and Assessment Instrument	Performance Objectives (Targets/Criteria) Measures:	Results for Measures of Student Learning:
BIO PLO #1: Demonstrate competency in written and oral communication. (ULOs: WC, OC, IRC) BIOCHE & CHE #5: Chemistry Writing: Construct a written cogent and logical scientific argument that adheres to an appropriate scientific style. (ULOs: WC) BIOCHE & CHE #7: Chemistry Presentation: Give a succinct oral presentation on a topic in chemistry. (ULOs: OC) BIO PLO #4: Read, analyze, and critique primary scientific literature. (ULOs: SI, WC) BIOCHE & CHE #2: Literature Awareness: Read and critique peer-reviewed scientific literature. (ULOs: WC)	BIO 499 - Final Written Report Final Oral Presentation BIO 499 or CHE 499 - Final Written Report Final Oral Presentation BIO 499 or CHE 499 - Final Written Report Final Oral Presentation BIO 499 - Final Written Report Final Oral Presentation BIO 499 or CHE 499 - Final Written Report Final Oral Presentation	75% or better of students assessed meeting or exceeding expectations on each Written Communication and Oral Communication ULO rubric criteria.	Written Communication Percentage of students who met or exceed expectations: Content / Context - 93% Organization / Coherence - 88% Sources / Synthesis - 92% Conventions / SWE - 93% Oral Communication Percentage of students who met or exceed expectations: Organization - 93% Language - 93% Delivery - 90% Supporting Material - 88% Central Message - 93%

Program Assessment Results

Written Communication



Oral Communication



Summary of Program Assessment Findings

Multiple similar PLOs are being assessed:

BIO PLO #1: Demonstrate competency in written and oral communication. (ULOs: WC, OC, IRC)

AND

BIOCHE & CHE #5: Chemistry Writing: Construct a written cogent and logical scientific argument that adheres to an appropriate scientific style. (ULOs: WC)

AND

BIOCHE & CHE #7: Chemistry Presentation: Give a succinct oral presentation on a topic in chemistry. (ULOs: OC)

WRITTEN COMMUNICATION: The expected standard was 75% of student assignments “meeting or exceeding expectations” within each of the WRITTEN COMMUNICATION rubric criteria. The results were as follows:

Content/Context: 93% of students met or exceeded expectations, representing 56 of 60 scores. The 4 scores that did not meet or exceed expectations included 2 students who scored as “Meets Expectations” by one reviewer and “Needs Improvement” by the second reviewer, and 1 student who was scored as “Needs Improvement” by both reviewers.

Organization/Coherence: 88% of students met or exceeded expectations, representing 53 of 60 scores. The 7 scores that did not meet or exceed expectations included 1 student who scored as “Meets Expectations” from one reviewer and “Needs Improvement” from the second reviewer, 1 student who scored “Needs Improvement” from one reviewer and “Below Expectations” from the second reviewer, and 2 students who scored as “Needs Improvement” by both reviewers.

Sources/Synthesis: 92% of students met or exceeded expectations, representing 55 of 60 scores. The 5 scores that did not meet or exceed expectations included 1 student who scored as “Meets Expectations” from one reviewer and “Needs Improvement” from the second reviewer, and 2 students who scored as “Needs Improvement” by both reviewers.

Conventions/SWE: 93% of students met or exceeded expectations, representing 56 of 60 scores. The 4 scores that did not meet or exceed expectations included 2 students who scored as “Meets Expectations” from one reviewer and “Needs Improvement” from the second reviewer, and 2 students who scored as “Needs Improvement” from one reviewer and “Below Expectations” by the second reviewer.

Overall, low scores were isolated to only 5 out of 30 students, with only 4 students receiving low marks for more than one criteria and from more than one reviewer. These four low-performing students represent 13% of those included in the assessment.

ORAL COMMUNICATION: The expected standard was 75% of student assignments “meeting or exceeding expectations” within each of the ORAL COMMUNICATION rubric criteria. The results were as follows:

Organization: 93% of students met or exceeded expectations, representing 56 of 60 scores. The 4 scores that did not meet or exceed expectations included 2 students who scored as “Meets Expectations” by one reviewer and “Needs Improvement” by the second reviewer, and 1 student who was scored as “Needs Improvement” by both reviewers.

Language: 93% of students met or exceeded expectations, representing 56 of 60 scores. The 4 scores that did not meet or exceed expectations included 2 students who scored as “Meets Expectations” from one reviewer and “Needs Improvement” from the second reviewer, 1 student who scored “Below Expectations” from both reviewers.

Delivery: 90% of students met or exceeded expectations, representing 54 of 60 scores. The 6 scores that did not meet or exceed expectations included 2 students who scored as “Meets Expectations” from one reviewer and “Needs Improvement” from the second reviewer, and 2 students who scored as “Needs Improvement” by both reviewers.

Supporting Material: 88% of students met or exceeded expectations, representing 53 of 60 scores. The 7 scores that did not meet or exceed expectations included 1 student who scored as “Meets Expectations” from one reviewer and “Needs Improvement” from the second reviewer, 2 students who scored as “Needs Improvement” from one reviewer and “Below Expectations” from the second reviewer and 1 student who scored as “Needs Improvement” by both reviewers.

Central Message: 93% of students met or exceeded expectations, representing 56 of 60 scores. The 4 scores that did not meet or exceed expectations included 1 student who scored as “Meets Expectations” from one reviewer and “Needs Improvement” from the second reviewer, 1 student who scored as “Meets Expectations” from one reviewer and “Below Expectations” from the second reviewer, and 1 student who scored “Below Expectations” from both reviewers.

Overall, low scores were isolated to only 5 out of 30 students, representing 16.7% of those included in the assessment. Three of these students were included among the low-performing students for the written assessment.

Multiple similar PLOs are being assessed:

BIO PLO #4: Read, analyze, and critique primary scientific literature. (ULOs: SI, WC)

AND

BIOCHE & CHE #2: Literature Awareness: Read and critique peer-reviewed scientific literature. (ULOs: WC)

WRITTEN COMMUNICATION: The expected standard was 75% of student assignments “meeting or exceeding expectations” within each of the WRITTEN COMMUNICATION rubric criteria. The results were as described above. Interpretation of results relevant to these particular PLOs is provided below.

ORAL COMMUNICATION: The expected standard was 75% of student assignments “meeting or exceeding expectations” within each of the ORAL COMMUNICATION rubric criteria. The results were as described above. Interpretation of results relevant to these particular PLOs is provided below. One of the lowest scoring criteria in the oral communication assessment was “Supporting Material”. Of the 5 students who received marks below expectations, only 4 received such low marks from both reviewers. Three of these four students were students who completed internship reflections, only one completed original scientific research.

Summary of Achievement Outcomes
Aligns with ULO: Written Communication / Oral Communication

2025-2026 PLO Assessed: Written Communication	Student Evidence: BIO 499 - Final Written Report	Student Evidence: CHE 499 - Final Written Report
Criterion Measured	Performance Target Was...	Performance Target Was...
Content / Context	Met	Met
Organization / Coherence	Met	Met
Sources / Synthesis	Met	Met
Conventions / SWE	Met	Met
2025-2026 PLO Assessed: Oral Communication	Student Evidence: BIO 499 Final Oral Presentation	Student Evidence: CHE 499 Final Oral Presentation
Criterion Measured	Performance Target Was...	Performance Target Was...
Organization	Met	Met
Language	Met	Met
Delivery	Met	Met
Supporting Material	Met	Met
Central Message	Met	Met

Program Proposed Course of Action for Improvement in Learning Outcomes

We plan to address the tendency for particular students to exhibit weaknesses across multiple criteria by attempting to identify those students earlier in their education and offering additional assistance through the help of supplemental instruction, tutoring, and academic coaching (i.e. a STEM coach). We also discussed the need for internship students, in particular, to provide better analysis of their primary sources. This can be achieved by scaffolding reading annotation assignments into the writing process during the Senior Thesis class. It may also be helpful to assess the use of primary literature sources using a different signature assignment for students who completed internships (and thus were not required to cite primary scientific literature in their reports/presentations).