Assessment Report for the 2022-2023 Academic Year
Natural Science Minor

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Mission Statement:

The core mission of the University of San Francisco is to educate students in the knowledge and skills required to succeed as professionals and as persons, while also teaching the sensitivity and values necessary to participate in a world shared by all people. The Department of Biology particularly emphasizes the core Jesuit value of advancing the freedom and responsibility to pursue truth and to follow evidence to its conclusion. In pursuit of these values, the faculty of the Department of Biology educates undergraduate students in current biological concepts, methodologies, and ethical practices in the laboratory and the natural environment to prepare them to succeed personally and professionally with the potential for advanced training in the sciences.

(No changes since last report)

Program Learning Outcomes:

The Natural Science Minor prepares students to:

1. Demonstrate broad knowledge of the concepts that comprise the natural sciences of biology, chemistry, and physics
2. Perform laboratory techniques used to evaluate and explore scientific problems
3. Apply the scientific process

(No changes since last report)

Curriculum Map:

See attached.

(No changes since last report)

Current Schedule for Assessment of Program Learning Outcomes (PLOs):

- 2022-2023: PLO #1
- 2023-2024: *Program review assessment/planning*
- 2024-2025: PLO #3
- 2025-2026: PLO #1

- 2026-2027: PLO #3
- 2027-2028: PLO #2

Methods for 2022-2023 Assessment:

In this report we assess **PLO #1**: Demonstrate broad knowledge of the concepts that comprise the natural sciences of biology, chemistry, and physics. In this assessment we address biology; chemistry and physics will be assessed in future years.

A random sample of 10 final examinations from the Spring 2023 section of BIOL 106: General Biology II were assessed. Representative questions were rated by a panel of two members of the assessment committee (Leslie Bach, Brian Young) using the rubric shown below. The rubric had two criteria for assessing the learning outcome. Raters scored each criterion on a scale of 1-4, with scores indicating the following: 4—exceeds expectations, 3—meets expectations, 2—needs improvement, and 1—below expectations. Ratings of faculty members were averaged for each student, and then these values were averaged across all exams to determine an overall score for each criterion. Results of individual exams are shown in Table I below.

	PERFORMANCE STANDARDS			
RUBRIC CRITERIA	*Exceeds Expectations (4)*	*Meets Expectations (3)*	*Needs Improvement (2)*	*Below Expectations (1)*
Explains scientific concepts and principles.	Accurately explains scientific concepts while demonstrating understanding and insight (e.g., depth of analysis, cleverness, originality, thoroughness)	Accurately explains scientific concepts.	Explains scientific concepts with limited accuracy.	Does not explain scientific concepts, or makes excessive errors.
Expresses knowledge in a broad range of biological topics.	Expresses comprehensive knowledge within a wide variety of areas in biology.	Expresses competent knowledge within a wide variety of topics, with comprehensive knowledge of some topics.	Expresses competent knowledge within a range of biological topics, with limited knowledge of some topics.	Expresses knowledge within a limited range of topics.

Table I

	Criteria 1	Criteria 2
Exam 1	2.75	3.75
Exam 2	2.25	3.75
Exam 3	2	2
Exam 4	2.25	3.25
Exam 5	4	4
Exam 6	4	4
Exam 7	3	3.75
Exam 8	3.25	3.25
Exam 9	3	3
Exam 10	3	3.75

Results and Findings of 2022-2023 Assessment:

As can be seen in table II below, with regard to criteria #1 ("Explains scientific concepts and principles'), student scored roughly at expectations, with an average score of 2.95. For this criteria, about 6 out of 10 students met or exceeded expectation. Further, students did quite well in demonstrating understanding in a broad range of scientific topics, with an average ranging of 3.4. For this metric, only 10% of students fell below expectations.

Table II

Criteria	Average rating	% of ratings above 3
Explains scientific concepts and principles.	2.95	60%
Expresses knowledge in a broad range of biological topics.	3.45	90%

Department Discussion and Response to Results

Assessment results were shared with the department in the September 26, 2023 Faculty Meeting.In general, this assessment seemed to reflect positively on the capacity of this course to introduce students to PLO#1. With respect to the second criteria, arguably the most relevant criteria to the PLO, a large proportion of students seem at or above expectations. With respect to the first criteria, a majority of the students were also at or above expectation, though fewer than for criteria #2. On the other hand, the class average was just slightly below expectations for this measure. Overall, the outcome of the assessment indicates that 90% of students evaluated were competent in explaining topics across a broad range of areas of biology, but a smaller majority (60%) were competent in explaining these concepts in detail.

These results were distributed to all biology faculty in advance of a monthly meeting and discussed as a department. Faculty noted that our assessment thus far has focused on knowledge of topics in Biology, and in future years we should seek to obtain exams from Chemistry and Physics courses included in the minor. This year we will also discuss adopting an "every other year" approach to assessing the minor, to help deal with the relatively small cohort sizes.

Response to Previous Year's Report Feedback

The previous year (AY21-22) Natural Science Minor Assessment Report was positive and did not suggest significant changes.

	PLO1	PLO2	PLO3
Institutional Learning Outcomes X Program Learning Outcomes	Demonstrate broad knowledge of the concepts that comprise the natural sciences of biology, chemistry, and physics.	Perform laboratory techniques used to evaluate and explore scientific principles.	Apply the scientific process.
Institutional Learning Outcomes			
1. Students reflect on and analyze their attitudes, beliefs, values, and assumptions about diverse communities and cultures and contribute to the common good.			
2. Students explain and apply disciplinary concepts, practices, and ethics of their chosen academic discipline in diverse communities.	X		X
3. Students construct, interpret, analyze, and evaluate information and ideas derived from a multitude of sources.	X		X
4. Students communicate effectively in written and oral forms to interact within their personal and professional communities.			
5. Students use technology to access and communicate information in their personal and professional lives.		X	X
6. Students use multiple methods of inquiry and research processes to answer questions and solve problems.		X	X
7. Students describe, analyze, and evaluate global interconnectedness in social, economic, environmental and political systems that shape diverse groups within the San Francisco Bay Area and the world.			

	PLO1	PLO2	PLO3
Program Learning Outcomes X Courses	Demonstrate broad knowledge of the concepts that comprise the natural sciences of biology, chemistry, and physics.	Perform laboratory techniques used to evaluate and explore scientific principles.	Apply the scientific process.
Courses or Program Requirement			
BIOL 105-General Biology I/Lab	I	I	I
BIOL 106-General Biology II/Lab	I	I	I
CHEM 230 -Organic Chemistry I	M	M	M
CHEM 231 - Organic Chemistry II	M	M	M
PHYS 100 - Introductory Physics I/Lab	M	M	M
PHYS 101 - Introductory Physics II/Lab	M	M	M
Key:			
Key:			
I = Introductory			
M = Intermediate			
A = Advanced			
CLO = Course Learning Outcome			