**WVSU Academic Affairs Assessment of Student Learning**

**Report for Academic Year 2023 - 2024**

**Biotechnology Graduate Program**

December 4, 2023

During the academic year 2023 - 2024, our Biotechnology Graduate Program undertook the evaluation of two key program learning outcomes:

1. PLO 1: This involved assessing students' proficiency in applying the Scientific Method to solve relevant issues in Biotechnology.
2. PLO 2: This focused on evaluating students' written and oral professional communication skills at a level expected of individuals holding a Master's degree in this discipline.

These program learning outcomes were established in the spring of 2023. This initiative was partially a response to the Biotechnology Program Review conducted in 2023 - 2024 and also a part of our continuous effort to develop a practical assessment framework.

To effectively evaluate both PLOs, our approach included analyzing grant proposals in the BT 567 course and reviewing topical presentations in the BT 511 course. For each course, we assessed the students' written and oral communication capabilities, ensuring that they could adeptly convey the same content in both formats.

The course "Current Concepts in Biotechnology" (BT 567) is a cornerstone of our program and is offered every fall semester. Students typically enroll in this course during their first or second semester, and it provides a foundational understanding of contemporary topics in biotechnology.

Similarly, the "Biotechnology Seminar" (BT 511) is a pivotal course that runs every semester. Students are expected to complete this course twice as part of the program requirements. Our assessment primarily focuses on evaluating students' performance during their second enrollment, which allows us to measure their progression and mastery of seminar presentation skills.

**In which course(s) were assessments conducted?** Assessments were conducted in two core courses: "Current Concepts in Biotechnology" (BT 567) and "Biotechnology Seminar" (BT 511). BT 567 provides a platform to assess written scientific communication through grant proposals, while BT 511 allows for the evaluation of oral communication skills through topical presentations.

**How did you assess the learning outcomes (s)?** We utilized several tools and methods tailored to each PLO to assess the learning outcomes. For PLO 1, we analyzed student grant proposals submitted in BT 567, using a rubric that focused on evaluating the application of the Scientific Method in addressing biotechnology-related problems. For PLO 2, we employed a rubric to evaluate students' oral presentations in BT 511, assessing their ability to convey scientific concepts clearly and professionally. The assessment committee attended presentations and reviewed written submissions to ensure consistency in evaluating both communication modes. Each rubric applied a five-point scale to measure performance, with detailed criteria outlining expectations for each score level.

**Who analyzed results and how were they analyzed?** The results were analyzed by the Biotechnology Program Assessment Committee, comprising Dr. Umesh Reddy (Program Coordinator), Ms. Madabathula Bhaavani (Data Analyst), and Dr. Padma Nimmakayala (Research Professor). The committee met regularly to review assessment data collected from BT 567 and BT 511 courses. They used statistical analysis to identify trends and benchmarks, comparing results against program expectations. The committee also utilized qualitative feedback from students' written work and presentations to inform their conclusions. Meetings were held to discuss findings, and actionable recommendations were formulated based on the data analysis.

**5 and 6. Summarize results/findings/conclusions (Data analysis) and next steps** The assessment results revealed that students demonstrated a solid understanding of the Scientific Method and professional communication skills, with most scoring within the proficient to advanced levels across both PLOs. The average scores for written grant proposals and oral presentations indicated steady performance with room for further improvement, particularly in synthesizing complex ideas and presenting them coherently.

Key findings included:

* PLO 1: Students showed strong foundational skills in applying the Scientific Method, but some struggled with clearly defining hypotheses and structuring experimental designs.
* PLO 2: While students displayed competence in written and oral professional communication, there were discrepancies in their ability to tailor their communication to diverse audiences.

The committee identified two primary areas for improvement: providing additional training on hypothesis formulation and enhancing students' ability to present scientific concepts to both technical and non-technical audiences.

Next steps include:

1. Revising course materials to offer more comprehensive guidance on formulating research questions and hypotheses.
2. Introducing new workshops focused on improving scientific communication tailored to different audience types.
3. Continuing the assessment of PLOs in the next academic year (2024 - 2025) to track progress and ensure that any interventions lead to measurable improvements.