# B.S. Degree Program in Molecular and Cellular Biology
# Assessment Plan

**We have identified four major learning objectives, and assessment efforts are focused on determining our level of success in meeting these goals.**

*Objective 1*. Students will understand the fundamental basics of molecular and cell biology by mastering key concepts in genetics, inorganic and organic chemistry, physics, biochemistry, biotechnology, and cell biology.

*Objective 2*. Students will develop both written and oral communication skills needed to be an effective scientist.

*Objective 3*. Students will develop the ability to formulate questions and adequately design experiments to test them. These problem-solving skills are crucial to the field of molecular and cellular biology.

*Objective 4*. Students will develop safe and effective laboratory skills, including those for handling chemicals, using instrumentation, and conducting basic DNA, protein, and cell manipulations.

**Plan for assessing learning objectives.**

*Objective 1.* Data will be collected from courses in the key concept areas of cell biology, molecular biology, and genetics. The data will be in the form of performance on exams and specific exam question tracking. Also, consistency in overall course grade point average will be monitored. Data will be collected each semester, and each year instructors of these benchmark classes will discuss whether targets for student learning are being achieved.

*Objective 2.* Data will be collected in separate areas for both written and oral communication. The required laboratory courses have mandated laboratory notebooks, and they are periodically collected and assessed. In addition, the 300-level elective courses have written papers and/or grant proposals that are required. The quality of these written works will be discussed annually by the Molecular and Cellular Biology core faculty to assess students' writing ability. Also, every Molecular and Cellular Biology student will have to orally present research articles in one of several 300-level courses. These presentations will be periodically attended by members of the Molecular and Cellular Biology core faculty, and student performance will be discussed annually. Data will be reported each semester, and benchmarks for each area will be established and reevaluated each year by the core Molecular and Cellular Biology faculty.

*Objective 3.* In at least two of the required laboratory courses, data will be collected in the form of end-of-project assignments that involve problem formulating and problem solving skills relevant to Molecular and Cellular Biology. Data will be reported annually and compared to established benchmarks.

*Objective 4.* Data will be collected in two areas: in-class assignments that involve equipment/instrumentation skills and laboratory work involving safe and effective practices in chemical and biological handling. Data will be collected each semester and compared to established benchmarks.

Feedback will be provided by several stakeholders. Current students will provide information regarding their satisfaction with courses/instructors and advising. Alumni will provide feedback in an annual alumni survey regarding program satisfaction and its strengths and weaknesses. Employers and graduate/professional schools are expected to provide feedback about the success of students graduating from the new degree program.

**Metrics for determining the level of success in meeting MCB learning objectives**

*Objective 1.*

1. All of the core courses have been taught for more than 10 years, so we will monitor the GPAs in these courses to make sure there are no significant deviations from historical numbers.

2. Exam question tracking (BSC 203, 219). Cell biology and genetics are the foundation of the Molecular and Cellular Biology major, and the basic concepts that all students must attain are relatively constant. Thus, we will have reoccurring exam questions in these two courses that we can use to assess whether students are grounded in the fundamentals. This assessment is key given that the major requires a grade of "C" or better in these two courses, so we want to ensure that content requirements remain solid.

*Objective 2.*

1. Homework problem that requires the finding and retrieval of electronic data/information (BSC 350, 351). In the genomics and bioinformatics era it is essential that our graduates are competent at sifting through the large databases available.

2. Assignment that requires oral presentation of molecular and cell biological knowledge (BSC 353 and BSC 354; and other 300-level electives). Oral communication is a key component to any scientist's training. The core faculty will annually discuss the competencies of our students' presentations.

3. Assignments that require clarity and correctness in written expression of experimental techniques and interpretation of results (BSC 353, 354, 367) will be sampled and assessed.

*Objective 3.*

1. An end-of-term assignment based on data/concept information requiring problem formulation and solution (BSC 353 and BSC 354) will be assessed and discussed by core faculty. These include the extensive laboratory notebooks and laboratory experimental write-ups required in these courses.

*Objective 4.*

1. Approximately 10 randomly selected students (i.e., two or three each from BSC 220, 353, 354, and 367) will be asked to demonstrate their competency with departmental equipment. Before any student can use a piece of equipment, the student must pass a "user's skills test." Thus, we will randomly check students each semester to ensure that they have mastered the skills completely and not merely for their skills test.

2. Ensure (via printed certificate) that all students complete online institutional biosafety training (all students in all laboratory courses).

3. Pre-laboratory safety talks (all laboratory courses): 100 percent of courses have pre-laboratory safety talks. This is standard operating procedure in all bench laboratory courses. Students not using safe practices are removed from the laboratory.

**Timeline for assessments of the MCB program**

Annual data analysis and response to the program review will follow the schedule outlined below:

May 15 - June 1: Program director reviews submitted data and requests any missing or incomplete items from the prior academic year.

June 1 – June 15: Program director meets with core faculty to discuss the data and any areas of concern.

September 1: Program director submits summary of data and indicates areas of concern to the Undergraduate Studies Committee.

October 1: Undergraduate Studies Committee meets and reviews how well assessment benchmarks have been met or are approaching the intended performance level for each of the outcome measures. Where there is a substantial shortfall and lack of progress, the Undergraduate Studies Committee and the Scheduling Committee will work together to formulate a rectification plan.

December 1: Any action plans will be forwarded to the School Curriculum Committee for further analysis and/or implementation.

February 1: Committees respond to action plans and submit summary of responses to the program director and school director.

May 1: Action plan and responses are included in the school's annual report.