



- 2) **Where are these learning outcomes published? Be specific.** (Where are the department's learning expectations accessible to potential majors: on the web or in the catalog or in your dept major handouts?)

Natural Science core learning outcomes are available on the [Arts and Sciences Core website](#).

Biology department major learning outcomes are available on the [biology department website undergraduate webpage](#).

- 3) **Other than GPA, what data/evidence is used to determine whether graduates have achieved the stated outcomes for the degree?** (What do you use to assess which of the student learning outcomes are being achieved more or less well?)

Each year, different aspects of the curriculum were assessed in different sections of our introductory/core courses. These two courses (Molecules and Cells and Ecology and Evolution) are major requirements, and also satisfy the Natural Science core requirement.

#### **Student Perceptions of Learning in Introductory Biology Courses**

In most sections of our introductory courses in Fall 2023 and Spring 2024, three likert-scale agree/disagree statements were added to student course evaluations (or in one case completed anonymously in class), to assess the extent to which students perceived the course addressing the core learning objectives. The statements are listed below as they were presented to students.

1. This course has increased my understanding of the biological sciences.
2. After taking this course, I am more confident in my ability to interpret the results of scientific experiments.
3. This course has increased my understanding of the role that science plays in society and the human condition

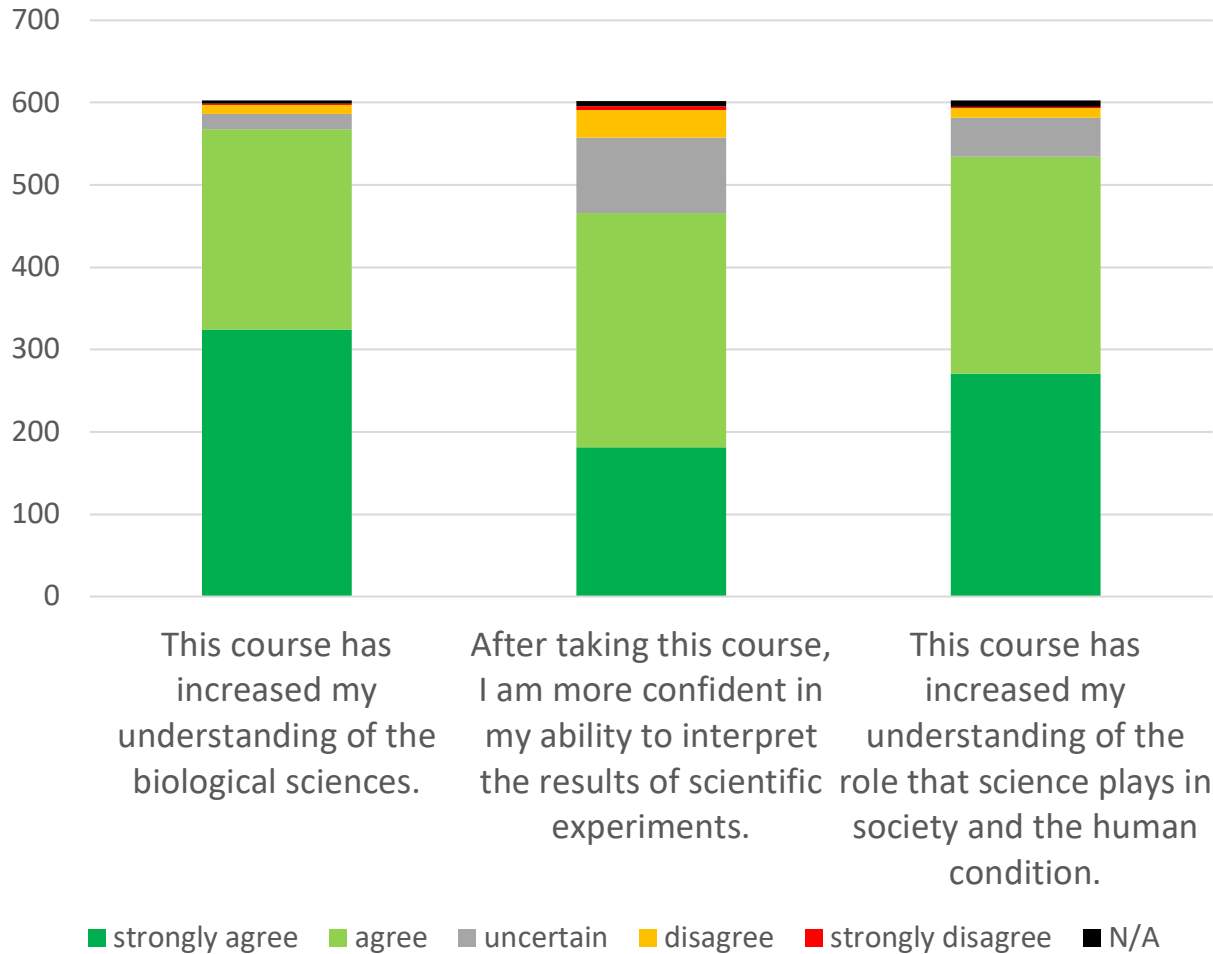
603 students responded to these questions at the end of their courses. The breakdown of responses is as follows:

- 144 students from Heather Olins' BIOL2010 in Fall 2023
- 128 students from Jeffery DaCosta's BIOL2010 in Spring 2024
- 76 students from Danielle Taghian's BIOL2000 in Fall 2023
- 111 students from Danielle Taghian's BIOL2000 in Spring 2024
- 144 students from Maitreyi Das' BIOL2000 in Spring 2024

From these pooled responses across both introductory courses, we see that the overwhelming majority of students (94%; Figure 1) agree or strongly agree with the statement "This course has increased my understanding of the biological sciences." A slightly smaller majority of students (89%; Figure 1) agree or strongly agree with the statement "This course has increased my understanding of the role that science plays in society and the human condition." Finally, a smaller majority of students (77%; Figure 1) agree or strongly agree with the statement "After taking this course, I am more confident in my ability to interpret the results of scientific experiments." The interpretation of scientific data continues to be a

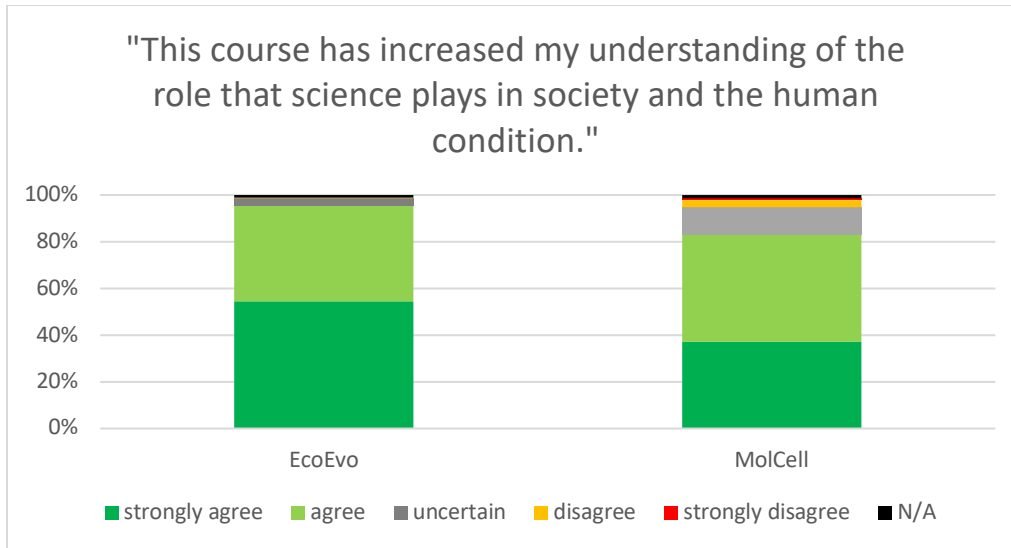
content area relevant to Core learning objectives that we focus on and continually strive to improve learning outcomes in these courses.

## Student Perception of Core Learning Objectives in Introductory Biology Courses



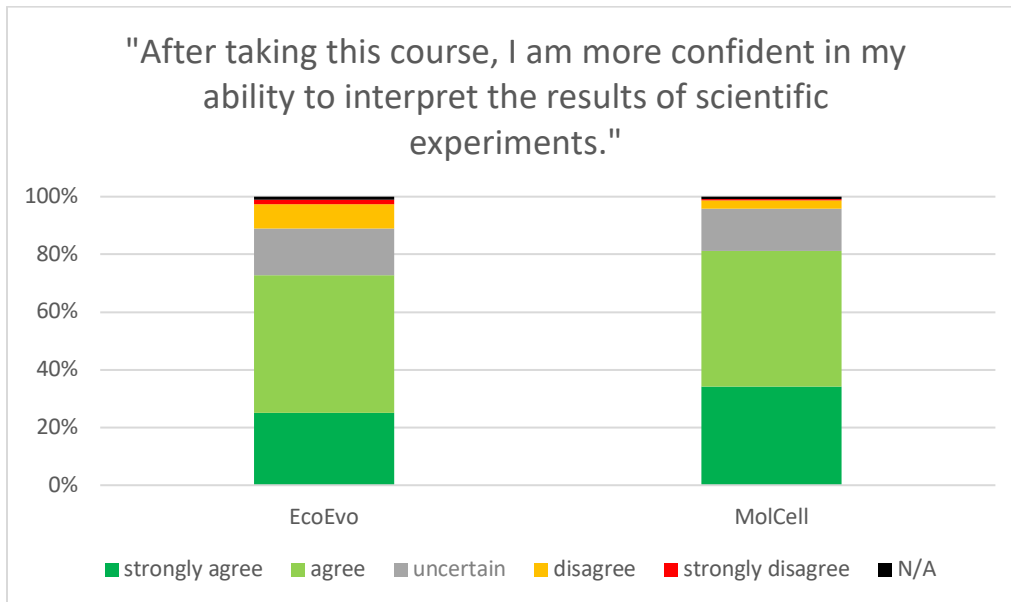
**Figure 1.** 603 students taking either Ecology and Evolution (BIOL2010; n=272) or Molecules and Cells (BIOL2000; n=331) shared the degree to which they agreed with these summary statements related to core learning goals at the end of the semester. Vertical axis represent raw number of student responses.

The responses from the two courses were similar for the first of these questions, but differed slightly in the second two which may point to differences in how these two courses support Core learning objectives. For the statement “This course has increased my understanding of the role that science plays in society and the human condition,” there was higher agreement and strong agreement from Ecology and Evolution students than from Molecules and Cells students (95% and 83% respectively; Figure 2).



**Figure 2.** A higher percentage of students in Ecology and Evolution (BIOL2010) agreed with the statement “This course has increased my understanding of the role that science plays in society and the human condition” (95%) than students from Molecules and Cells (BIOL2000; 83%).

In contrast, for the statement “After taking this course, I am more confident in my ability to interpret the results of scientific experiments,” there was lower agreement and strong agreement from Ecology and Evolution students than from Molecules and Cells students (73% and 81% respectively; Figure 3).



**Figure 3.** A lower percentage of students in Ecology and Evolution (BIOL2010) agreed with the statement “After taking this course, I am more confident in my ability to interpret the results of scientific experiments” (73%) than students from Molecules and Cells (BIOL2000; 81%).

It seems that students in Ecology and Evolution perceive connections between course material and the “role that science plays in society and the human condition” to a greater extent than students in Molecules and Cells (though

it is worth noticing that in both classes the majority of students do seem to perceive these connections. In contrast, it seems that students in Ecology and Evolution perceive learning gains in interpreting scientific data to a lesser extent than students in Molecules and Cells (though, again, it is worth noting that these learning gains are perceived by a majority of students in both courses).

**Assessment of students' ability to assess scientific data through figures.**

In all of these introductory courses, final exam questions are designed to measure students' ability to assess scientific data through figures. Student responses to these questions are compared with student responses to similar questions from beginning-of-semester assessments. In general, these analyses demonstrate that student ability to interpret scientific data through figures is better at the end of the semester than at the beginning of the semester.

- 4) **Who interprets the evidence? What is the process?** (Who in the department is responsible for interpreting the data and making recommendations for curriculum or assignment changes if appropriate?)

Department Core Representative (Heather Olins) and faculty teaching in the core.

- 5) **What changes have been made as a result of using the data/evidence?** (Have there been any recent changes to your curriculum or program? Why were they made?)

In previous years, this assessment focused on non-majors courses. The shift to our introductory courses occurred in the 2021-2022 academic year. We are still determining the most appropriate and meaningful ways to assess core learning objectives in these courses. As such, no department-wide changes have been made yet as a direct result of these analyses. However, our focus for this coming year continues to be on the interpretation of scientific findings and attempting to better understand what skills our students have and need to develop in this area. Individual instructors have described adding or increasing the frequency of in-class opportunities to practice this type of data analysis as well as increasing communication and transparency with students about scientific data analysis being a skill that will be developed in the course.

- 6) **What evidence do you have that the changes have resulted in improved learning outcomes?**

See previous response. We anticipate that an increased emphasis on applied data analysis, and discussions highlighting the relevance of these skills, will lead to higher overall agreement with statement 2 above (After taking this course, I am more confident in my ability to interpret the results of scientific experiments) in subsequent rounds of assessment.

- 7) **Date of the most recent program review.** (Your latest comprehensive departmental self-study and external review.)

2019-2025 (still in progress). Previously completed in 2007.