University of Arkansas
Department of Biological Sciences
BISC Undergraduate Program Assessment (BIOL BA, BIOL BS)
Report: Academic Year 2021-2022

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A. General Background:

Recognizing that the combined BIOL-BA and BIOL-BS programs constitute 1082 undergraduate majors (AY2021-2022 enrollment report: BA=260 and BS=822) based on data from the Office of Institutional Research and Assessment and approximately 200 graduating seniors per academic year, sub-sampling our students seemed the most effective way to assess our program. Our assessment utilizes a sub-sampling of our graduating seniors that are pre-medical students taking the Medical College Admission Test (MCAT). This is advantageous because the national MCAT scores are published, providing a benchmark for evaluating our program relative to other programs nationally. Since both the B.A. and B.S. Biology degrees requires the same four core courses (Cell Biology, General Genetics, Evolutionary Biology and General Ecology), our assessment considers these degrees together. We provide cumulative data to establish a longitudinal assessment of our program and course offerings.

B. Outcome Reporting:

Program Goals:

1. Foster the scientific curiosity of students about biological sciences.
2. Communicate the current state of knowledge and technology to students.
3. Nurture critical thinking, reasoning, and problem-solving abilities.
4. Enhance students' communication skills for communicating scientific ideas.
5. Prepare students to achieve academic and professional success.

Student Learning Outcomes:

The following learning outcomes mirror those proposed in several recent reviews of biology pedagogy. They apply to the both the introductory biology course and to completion of the department's common core of courses, cell biology, genetics, evolutionary biology, and ecology.

1. Show that you can understand data that support the hypothesis that all organisms are genealogically related including the recognition that all organisms are cellular and that they share the same basic genetic system.
2. Show that you can understand data that support the hypothesis that all organisms need energy and a source of building blocks to maintain themselves, grow, and reproduce.
3. Show that you can understand data that support the hypothesis that all organisms use information to maintain themselves, grow, and reproduce, and that that information can both be stored genetically and be received from the environment.
4. Show that you can understand data that support the hypothesis that all organisms interact both with other organisms and with the physical components of their environment and that these interactions affect their ability to maintain themselves, grow, and reproduce.
5. Show that you can distinguish data-supported interpretations of biological systems from anecdotal information.
6. Show that you can understand and use quantitative methods for explaining how biological systems work. This will include graph interpretation, table interpretation, and basic mathematical formulas.
7. Show that you can apply the information that has been presented during the course to novel situations.

Subsampling with the MCAT:

The Department of Biological Sciences graduated 186 students with either a BA (75) or BS (111) degree in 2022. Many these students are declared premedical students and take the MCAT exam as an entry-level test for Medical School aptitude. The department has access to summary statistics for our students that participate in the MCAT and applied to medical school. Importantly, the statistical summaries of the MCAT results nationally are published for all students that applied to medical school. The scoring system for the MCAT changed in April 2015, so our assessment includes scores based on this scoring strategy. Importantly, the combined scores on the MCAT range from 472 to 528 with the mean and median at 500. This provides a mechanism by which to compare UA Biology students with other Biology students nationwide that participated in the exam. Table 1 shows the data for MCAT scores from 2015 to 2022. These data do not differentiate between Biology BA and BS degree students; however, as indicated above both degrees share identical core biology courses, so we take the data to represent the quality of performance for both degree programs regarding our biology core classes. Moreover, most of the AY2022 Biology majors are seeking a B.S. degree (~75%) with the B.A. (~25%) representing a lesser contribution to the overall result.

Table 1: MCAT scores for Biology Majors 2015-2022

YEAR	# BIOL Students	Accepted med schl	BIOL Majors Average	BIOL U.S.*	Overall U.S.*
2015	57		502	*NA*	*NA*
2016	71		501.8	501.6	501.8
2017	81		502.4	504.5	505.8
2018	79	41	502.8	505.5	505.6
2019	79	47	504.0	506.0	506.1
2020	93	46	503.9	506.3	506.4
2021	81	48	502.3	505.9	505.9
2022	74	47	503	506.4	506.5

** NA: not available*

Based on the national average, BIOL majors (BS and BA combined) performed above the MCAT median of 500 (Table 1). While UA BIOL majors are slightly below the national average for BIOL majors and the overall U.S. average, we have been encouraged by the incremental increases observed since 2018. Unfortunately, we observed a significant drop in test scores in 2021 that is also noted for Biology majors nationwide and with the overall MCAT scores. Whether this was related to Covid-19 and online education is not known, but there appears to be a slight rebound of the scores in 2022 which is positive news. While we do not believe there should be a major change in our current curriculum, we will continue to seek improvements in our current course offerings. Since the new MCAT, implemented in 2015, is strongly focused on critical reasoning skills, our curriculum will continue to improve in this area.

C. Summary:

The BIOL undergraduate assessment continues to reflect positive data based on the MCAT scores, suggesting that our program is effectively serving our undergraduate students. In AY2021-2022, we had 74 BIOL majors take the MCAT with an average score of 503 compared to the U.S. BIOL majors average of 506.4. Our goal for improvement is to reach or exceed the national average for BIOL majors. In 2022, we had 47 Biology majors accepted to medical school, for an acceptance rate that continues to exceed 50% as compared to the national average of 41%. Another indicator of our program success.

Future directions: We will continue to focus on improving critical thinking skills for our biology majors. At this time, we do not believe changing the course offerings is necessary, rather a major focus on developing the ability of our students to analyze data and reach conclusions.