

**Biology**  
**FELOs in Biology Courses, S2022**

**A. PLNU General Education courses (BIO 1001, 1002, 1003, 1005, 2010 & 2011)**

**FELO 1d: Critical Thinking**

Students will be able to examine, critique and synthesize information in order to arrive at reasoned conclusions. This outcome will be measured yearly via direct, summative assessment.

**Outcome Measure:** Signature Assignment: Multiple choice questions on the final exam taken from the Test of Scientific Literacy Skills (TOSLS). The whole class was assessed.

**Criteria for Success:** For BIO1001, 1002, 1003, 1005, 2010, and 2011, at least 60% of the students will answer the questions correctly (an average of 60% for all of the questions). 60% was chosen since these are all introductory courses. BIO2010 and BIO2011 are freshmen courses for all Biology Department majors and also service courses for Allied Health majors. BIO1001, 1002, 1003, and 1005 are General Biology courses for all other majors. Questions from the TOSLS were chosen that specifically addressed critical thinking and were appropriate for the content of each course.

**Longitudinal Data:**

	SPRING, 2022		FALL, 2021		SPRING, 2021		FALL, 2019	
Class	n	% of Students Answering TOSLS Questions Correctly (Ave + S.D.)	n	% of Students Answering TOSLS Questions Correctly (Ave + S.D.)	n	% of Students Answering TOSLS Questions Correctly (Ave + S.D.)	n	% of Students Answering TOSLS Questions Correctly (Ave + S.D.)
BIO1001	NA	Not tested	43	81 $\pm$ 13	NA	NA (COVID)	42	79 $\pm$ 13
BIO1002	NA	Not offered	76	68 $\pm$ 6	NA	NA (not offered)	NA	NA
BIO1003	47	76 $\pm$ 11	45	72 $\pm$ 16	NA	NA (COVID)	48	72 $\pm$ 15
BIO1005	39	71 $\pm$ 12	NA	Not tested	37	65 $\pm$ 11	45	76 $\pm$ 10
BIO2010	92	80 $\pm$ 13	91	76 $\pm$ 15	88	82 $\pm$ 10	93	80 $\pm$ 14
BIO2011	70	76 $\pm$ 9	46	72 $\pm$ 4	52	82 $\pm$ 10	38	75 $\pm$ 7

**Conclusions Drawn from Data:** The students in the various GE courses are meeting the criteria for critical thinking. These data were not collected in 2020 due to COVID.

**Changes to be Made Based on Data:** We will continue to use these questions for summative assessment in our GE courses.

**Rubric:**

Gormally, C., Brickman, P., and Lutz, M. “Developing a Test of Scientific Literacy Skills (TOSLS): Measuring Undergraduates’ Evaluation of Scientific Information and Arguments.” C.B. E. Life Science Education 11(4): 364–377 (2012).

BIO1001: Questions 1, 4, 6, 7, 8, 11, 12, 13, 14, 18, 28

BIO1002: Questions 2, 6, 18, 28

BIO1003: Questions 4, 6, 7, 8, 11, 12, 13, 14, 18, 28

BIO1005: Questions 2, 6, 18, 28

BIO2010: Questions 1, 2, 7, 8, 11, 18, 19, 24, 25

BIO2011: Questions 2, 6, 18, 28