

B. Biology Sequence Outcomes

- Demonstrate an ability to apply and understand the scientific method and its limitations in the search for answers to biological questions
- Recognize the role of scientific analysis in creating an understanding of the biology of the gene
- Appraise the role of modern evolutionary theory as the major unifying theme of all biological sciences.
- Demonstrate knowledge of basic terminology used in the study of the human body.
- Describe anatomical characteristics of human organ systems.
- Describe basic physiological processes of the human body.
- Explain how human organ systems interact to maintain homeostasis.

The division reviewed the Liberal Arts and Sciences program learning outcomes during Spring 2001

III. **Assessment Method(s)**: A measurable indicator of success in attaining the stated learning outcome(s). The methodology should be both reliable and valid. Please describe in detail.

- a. Formative Assessment Methods(s) and Description: a measurable indicator of student in-progress success in attaining the stated learning outcome(s).

The Biology Department, since the 1994-95 academic year, has conducted pre- and post- assessment in the General Biology sequence (BIO 111,112,113) and in the Anatomy & Physiology sequence (BIO 141, 142, 143).

The General Biology Assessment Test is given to students during the first week of BIO 111. The same test is administered again at the end of BIO 113. The purpose of the pre-tests is to establish a basis for determining and measuring learning gains. The pretest administered in BIO 111 is not used in calculation of the final grade, but the posttest may be included in the last regular test in BIO 113 at the instructor's discretion. Most students who enroll in this sequence are transfer students and non-science majors.

The Anatomy and Physiology Assessment Test is given to students during the first week of BIO 141. The same test is administered again at the end of BIO 143. The purpose of the pre-test is to establish a basis for determining and measuring learning gains. The pretest administered in BIO 141 is not used in calculation of the final grade, but the posttest may be included in the last regular test in BIO 143 at the instructor's discretion. Most students who enroll in this sequence are fulfilling requirements related to Allied Health programs.

The Biology department has developed common syllabi with common objectives for each course in the two sequences. Each instructor develops his/her own individual course exams and two common laboratory practical exams are conducted in each course.

- b. Summative Assessment Method(s) and Description: a measurable indicator of end-of-program success in attaining the stated program learning outcome(s).

This section is not applicable to sequence assessment. Refer to the section in this Report on the summative assessment of the program learning outcomes for Liberal Arts and Sciences.

- IV. **Results:** A description of the actual results of overall student performance gathered from the summative assessment(s). (see III.b.)

General Biology Assessment Test Results

Pretest Bio-111	Number of Students Tested	Median Score out of 25	Mean Score out of 25		Standard Deviation
Fall 1998	272	9.50	8.33	33.3%	2.51
Winter 1999	50	5.50	8.66	34.6%	2.51
Spring 1999	95	7.82	8.22	32.9%	2.48
Fall 1999	117	8.47	8.72	34.9%	2.65
Winter 2000	146	8.08	8.25	34.0%	2.27
Spring 2000	89	9.08	9.34	37.3%	2.86
Fall 2000	218	8.55	8.58	34%	2.41
Winter 2001	58	7.7	7.84	31.4	2.21
Spring 2001	29	8/13	8.21	32.8	2.2
Fall 2001	80	8.58	8.79	35.2	2.47
Winter 2002	46	9.74	9.17	36.7	3.96
Spring 2002	30	8.5	9.13	36.5	3/59
Fall 2002	62	8.59	8.79	35.2	2.26
	Total	Average	Average	Average	
	1292	8.3	8.62	34.5	

Post Test Bio-113	Number of Students Tested	Median Score out of 25	Mean Score out of 25		Standard Deviation
Fall 1998	33	12.88	13.15	52.6%	3.16
Winter 1999	40	13.50	13.28	52.8%	2.77
Spring 1999	39	14.00	13.77	55.1%	3.33
Fall 1999	32	12.90	12.78	51.1%	3.30
Winter 2000	27	14.00	14.15	56.6%	3.83
Spring 2000	53	14.50	14.14	56.6%	3.64
Fall 2000	20	12.83	12.45	49.8%	3.40
Winter 2001	25	14.4	14.88	59.5	2.88
Spring 2001	40	13.83	14.05	58.2	4.02
Fall 2001	24	13.9	13.63	54.5	2.5
Winter 2002	23	12.33	13.04	52.2	3.48
Spring 2002	24	14.5	14.42	57.7	3.17
Fall 2002	37	12.67	12.73	50.9	3.96
	Total	Average	Average	Average	
	417	13.6	13.6	54.3	

Anatomy and Physiology Assessment Test Results

Pretest Bio-141	Number of Students Tested	Median Score out of 25	Mean Score out of 25		Standard Deviation
Winter 1998	214	--	8.3	33.0%	3.15
Spring 1998	159	--	8.25	34.0%	3.07
Fall 1998	182	7.21	7.26	29.0%	2.63
Winter 1999	118	7.89	8.16	33.0%	2.94
Winter 2000	134	7.87	7.76	31.0%	3.21
Spring 2000	143	6.43	7.09	28.0%	2.99
Summer 2000	14	6.00	7.07	29%	3.17
Fall 2000	182	7.95	8.31	33%	3.57
Winter 2001	9		8.89	35.56	2.51
Spring 2001	165		8.06	32.24	3.17
Fall 2001	112		7.82	31.28	2.98
Winter 2002	230		5.13	20.52	3.05
Spring 2002	115		8.22	32.88	3.20
Summer 2002	38		9.45	37.8	3.18
Fall 2002	187		8.78	34.32	3.25
	Total		Average	Average	
	2002		7.89	31.65	

Post Test Bio-143	Number of Students Tested	Median Score out of 25	Mean Score out of 25		Standard Deviation
Winter 1998	7	--	15.86	63.0%	2.64
Spring 1998	53	--	17.00	68.0%	3.29
Fall 1998	--	--	--	--	--
Winter 1999	47	14.00	13.76	53.0%	2.76
Winter 2000	51	15.06	15.04	60%	3.87
Spring 2000	72	15.5	14.93	60%	3.57
Summer 2000	41	15.86	16.27	65%	3.45
Winter 2001	60		15.8	63.2	3.17
Spring 2001	50		15.42	61.68	3.54
Summer 2001	28		15.96	63.84	3.57
Fall 2001	67		15.31	61.24	3.09
Winter 2002	93		15.77	63.08	3.49
Spring 2002	59		16.56	66.24	3.23
Summer 2002	48		16.21	64.84	2.69
	Total		Average	Average	
	676		15.68	62.55	

- V. **Analysis/Actions:** From analysis of your summative assessment results, do you plan to or have you made any adjustments to your program learning outcomes, methodologies, curriculum, etc.? If yes, describe. If no, explain.

Program learning outcomes have not changed since the division revised them in 2001. However, the Biology department continually evaluates its courses and refreshes its syllabi, revises lab manuals and exercises, updates the curriculum, and modifies topics as needed. As the basic science and understanding of biology improves, we upgrade our program and add new activities in lab.

- VI. **General Education:** A description of where and how within the major the three primary general education outcomes* (communication, thinking, values/citizenship/community) are assessed.

- a. Where within the major do you assess written communication? Describe the assessment method(s) used. Describe assessment results if available.

BIO 171-173 (science major sequence) requires written laboratory notebooks and uses essay questions on exams.

BIO 205, Microbiology, uses case studies that include both written and oral communication activities. The department has developed their own checklist for assessing these skills.

BIO 222 Evolution (new course) uses written summaries of presentations and uses essay questions on exams.

BIO 225/226 Ecology requires a written term paper, weekly laboratory reports, and an extensive Field Study report.

BIO 227 Tropical Ecology requires a written term paper.

All BTN (biotechnology) laboratory courses require a industry-standard laboratory notebook. Essay questions on lecture material and written project reports are required in some BTN courses. Students must create a Resume and Cover Letter in BTN 295 Seminar.

- b. Where within the major do you assess oral communication? Describe the assessment method(s) used. Describe assessment results if available.

BIO 205, Microbiology, uses case studies that include both written and oral communication activities. The department has developed its own rubric for assessing these student presentations.

Students in BIO 225 Ecology must present their term paper to the class.

Students in BTN 110 give an oral presentation of a term project related to biotechnology and bioethics.

- c. Where within the major do you assess thinking? Thinking might include inventing new problems, seeing relationships and/or implications, respecting other approaches, demonstrating clarity and/or integrity, or recognizing assumptions. Describe the assessment method(s) used. Describe assessment results if available.

All Biology courses assess thinking through lab activities and lab practical exams, applications of the scientific method and course testing. In BTN laboratory courses, students are entirely responsible for setting up and taking down their experimental work. The charts in the Results section shows data collected on thinking skills.

Students in BIO 225/226 develop a comprehensive Field Study that involves scientific design of an experiment, data collection and analysis, conclusions, and a written report.

- d. Where within the major do you assess values/citizenship/community? These activities might include behaviors, perspective, awareness, responsibility, teamwork, ethical/professional standards, service learning or community participation. Describe the assessment method(s) used. Describe assessment results if available.

Biology labs require students and faculty to follow OSHA standards for safety behaviors. For example, eye protection is required in all labs; students not complying must either correct the problem or they cannot participate. No other safety violations have been a problem.

BIO 225/226 Ecology students take field trips and meet local biologists who work for Five Rivers Metro Parks, Beaver Creek Wetlands Assn., Cedar Bog, and local universities. During class and field trips, students focus on environmental issues and values.

BIO 227, Tropical Ecology, involves students in community field trips to promote cultural awareness and global citizenship. Students travel to Belize, CA for two weeks and live in a small community where they meet the local citizens.

BTN 110 Biotechnology and Bioethics spends a good portion of the course discussing ethical issues related to biotechnology.

Teamwork activities are used in many Biology courses; teams are used in all Biology labs. Teamwork activities integrate many general education skills: oral communication, thinking, valuing others and sometimes written communication. The BIOSIS open Lab also promotes teamwork and collaborative learning.

The Biology Club participates in various community activities such as Great Miami River corridor clean-up, collection of food for families during the holidays, and is currently involved in testing the water quality for residents of Cedarville, OH who live near the polluted Massey Creek.

The department keeps copies of all the general education checklists on file and available to faculty. Some faculty have attended General Education Day.

The department has assisted the General Education Committee in doing summative assessment research by providing copies of student work when requested.