



- Demonstrate Global awareness.
- Group participation and social interaction.
- Demonstrate Communication skills through accessing appropriate print and electronic resources and successfully completing oral and written assignments.
- Demonstrate Professional Effectiveness through self-assessment.

B. Examples of 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
- Characterize fundamental inorganic and organic chemical substances and metabolic reactions common to living organisms.
- Appraise the role of modern evolutionary theory as the major unifying theme of all biological sciences.
- Integrate knowledge of basic terminology used in the study of the human body.
- Categorize and analyze selected human and other mammalian tissues and organs using microscopic and gross anatomical dissection techniques.
- Survey and point out anatomical characteristics of human organ systems.
- Appraise, survey, and evaluate basic physiological processes of the human body.
- Assess how human organ systems interact to maintain homeostasis.

The Liberal Arts and Sciences program learning outcomes were reviewed by the division 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 has used an assessment tool in two sequences since the 1994-95 academic year. We assess students in the non-majors General Biology Series (BIO 111,112,113) and in Anatomy & Physiology (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 the sequence, in BIO 113. The purposes of the pre/post tests are to establish a basis for determining learning gains and to measure 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. Students who enroll in this sequence are 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 purposes of the pre/post tests are to establish a basis for determining learning gains and to measure 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 enrolled in Allied Health programs.

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

- 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
Spring 2003	25	8.13	8.36	32.0	2.21
Spring 2004	36	8.50	8.61	36.0	2.57
	<b>Total</b>	<b>Average</b>	<b>Average</b>	<b>Average</b>	
	<b>1353</b>	<b>8.338</b>	<b>8.594</b>	<b>34.5</b>	

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	56.2	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
Spring 2003	20	13.0	13.3	54	3.15
Spring 2004	44	12.3	12.52	52	3.13
	<b>Total</b>	<b>Average</b>	<b>Average</b>	<b>Average</b>	
	<b>478</b>	<b>13.44</b>	<b>12.69</b>	<b>54.77</b>	

### Anatomy and Physiology Assessment Test Results

Pretest Bio-141	Number of Students Tested	Mean Score out of 25		Standard Deviation
		Score	Percentage	
Winter 1998	214	8.3	33.0%	3.15
Spring 1998	159	8.25	34.0%	3.07
Fall 1998	182	7.26	29.0%	2.63
Winter 1999	118	8.16	33.0%	2.94
Winter 2000	134	7.76	31.0%	3.21
Spring 2000	143	7.09	28.0%	2.99
Summer 2000	14	7.07	29%	3.17
Fall 2000	182	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	8.58	34.32	3.25
Winter 2003	168	8.55	34.20	3.43
Spring 2003	153	8.91	35.64	3.38
Fall 2003	257	8.39	33.56	3.31
Winter 2004	219	8.35	33.40	3.18
Spring 2004	219	8.68	34.72	3.29
Summer 2004	27	10.41	41.64	3.88
Fall 2004	262	8.39	33.56	2.89
Winter 2005	165	8.56	34.24	3.24
	<b>Total</b>	<b>Average</b>	<b>Average</b>	
	<b>3470</b>	<b>8.20</b>	<b>32.85</b>	

Post Test Bio-143	Number of Students Tested	Mean Score out of 25		Standard Deviation
		Score	Percentage	
Winter 1998	7	15.86	63.0%	2.64
Spring 1998	53	17.00	68.0%	3.29
Winter 1999	47	13.76	53.0%	2.76
Winter 2000	51	15.04	60%	3.87
Spring 2000	72	14.93	60%	3.57
Summer 2000	41	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
Fall 2002	98	14.97	59.88	4.61
Winter 2003	89	15.94	63.76	3.58
Spring 2003	117	16.03	64.12	3.25
Fall 2003	82	16.25	64.98	3.42
Winter 2004	108	16.31	65.24	3.26
Spring 2004	115	15.48	61.92	3.54
Summer 2004	60	16.55	66.20	2.72
Fall 2004	69	16.17	64.68	3.00
	<b>Total</b>	<b>Average</b>	<b>Average</b>	
	<b>1414</b>	<b>15.74</b>	<b>62.57</b>	

- 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. 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 grows, we upgrade our program. Our last major revision of course outcomes was in Spring 2004. During Fall, 2004 BIO 149 lab curriculum was revised after consultation with the Nursing Department.

**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 171,172,173 (Principles of Biology - majors' sequence) requires written laboratory reports that may include data analysis (using Excel), a detailed description of materials and methods, and sections with results and conclusions.

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

BIO 222 Evolution requires students to write two papers and the exams require written answers to several essay questions.

Biotechnology laboratory courses require a laboratory notebook that is checked every week. The records kept in the notebook must conform to industry/research standards, as if the notebook was a legal document. Most exams in biotech lecture courses include short-answer questions.

BTN 115 Careers in Biotechnology requires each student to write a personal Resume.

BTN 110 requires library research, a written report and oral presentation on a current topic in biotechnology.

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

BIO 171, 172, 173 Principles of Biology (majors sequence) Honors courses require a research project which includes a paper and an oral presentation.

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.

BTN 110 Introduction to Biotechnology requires library research, a written report and oral presentation on a current topic in biotechnology.

BTN 295 Seminar requires each student to present a 30 minute seminar on a current topic in biotechnology that is critiqued by peer-evaluations and via an oral presentation rubric used by the instructor.

- 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, applications of the scientific method and course testing. The chart in the Results section shows data collected on thinking skills.

Biotechnology laboratory courses require students to follow SOPs (Standard Operating Procedures), interpret and follow written protocols, set-up their own work stations requiring a knowledge and understanding of supplies and equipment, operate instruments, observe safety regulations, etc.

BTN 110 requires students to discuss ethical implications and controversies of biotechnology such as stem cell research, gene therapy, genetically modified foods, and cloning.

- 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 and biotechnology 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 297, Tropical Ecology, involves students in community field trips to promote cultural awareness and global citizenship.

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 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.

## **VII. Recommendations**

The Biology department has anecdotal evidence but no real data on how students perform in Biology courses after they transfer to four-year institutions.