Biology

Mission

The Biology Department prepares students for careers in biology and science education, and admission to graduate and professional schools in the life and health sciences. We also promote the understanding of biology as an essential part of a liberal arts education and of global citizenship.

Learning Outcomes

Students will:

1) Understand key concepts from the many disciplines within the biological sciences.

2) Engage in laboratory experimentation, data analysis and interpretation, and critical thinking at all course levels.

3) Have opportunities to augment their coursework experiences with advanced studies and research within areas of particular interest.

Learning Outcomes Assessment

Student assessment efforts such as annual administration of the Educational Testing Service's Major Field Test in Biology, began just prior to the previous self-study, have been maintained and expanded. {Link to 10 years of ETS Biology ETS Data in MainDoc} Specifically, the department has implemented the administration of a set of pre-/post-course content knowledge exams for each of the courses in the non-majors biology sequence (Bi 101, 102, 103). In addition, a pre-/post-course attitudinal survey has been developed and employed for courses associated with the optional PLTL program. The results, along with their analysis and interpretation, from these efforts are discussed in the unit assessment section below.

Program Description

The Biology Department offers a B.S./B.A. degree and two minors, and supports the Biology Teacher Education degree, each of which fulfill components of our mission (see table below). To prepare for careers in biology or admission to graduate school, students can choose from five different emphases (see table below). To prepare for admission to professional health science programs, students pursue the pre-professional emphasis. To prepare for careers in Biology Education, students can choose to either major in Education or Biology and then pursue a Masters of Arts in Teaching (MAT).

Following a departmental retreat in Fall, 2004, the Biology program was restructured in order to better accommodate the changing needs of our students and to better reflect discipline-specific expertise of the faculty. These changes should facilitate more effective and efficient student advising.

The restructured Biology Program requires that all Biology majors take a common core that includes a one-year foundation sequence (BI 211, 212, and 213) plus 300/400-level coursework in genetics, evolution, cell biology, ecology, microbiology, and organismal biology. Minors have been designed

to complement many majors, both within and beyond the Division of Natural Sciences and Mathematics (NSM).

Biology Program Minors	Total Credits
Biology	26
Human Biology	27

Biology Common Core	56 – 59 Credits

Biology Degree Emphasis Options	Credits in Emphasis
General Biology	21 – 24 (+ common core = 77 – 83)
Botany	21 – 24 (+ common core = 77 – 83)
Ecology	21 – 22 (+ common core = 77 – 81)
Molecular / Cell	22 - 23 (+ common core = 78 – 82)
Pre-professional	24 – 25 (+ common core = 80 – 84)
Zoology	22 – 24 (+ common core = 78 - 83)

Key Changes Since Last Accreditation Report

Since its last accreditation report, the Biology department has pursued remedies for four broad areas of concern and interest described in the 1997 self-study, these are:

1) greater retention and insufficient preparation of incoming students;

2) additional assessment;

3) increases in departmental budgets, supplies, and technology, and;

4) increased opportunities for undergraduate research.

Progress has been made in addressing each of these areas as follows.

1) A two to three-fold increase in graduating majors has been achieved along with improved retention in post-200 series courses. The implementation of Peer-Led Team Learning (PLTL) represents a significant investment in retention efforts at both the majors, and non-majors levels.

2) A 100-series assessment has been employed since 2001 (see unit assessment section below) and the utilization of the Educational Testing Service's Major Field Examination in Biology since 1996 have been major efforts to secure meaningful data about our students.

3) Significant budget increases have allowed for increased spending on microscopes and other modern laboratory equipment and computer resources in laboratories and classrooms. These improvements have provided greater opportunities for the infusion of technology-based curricula into many of our courses (see supplemental materials and facilities and technology section below).

Inventories of virtually all the department's equipment, software and many consumables, have been created and are maintained by the laboratory preparator.

4) Goals mentioned in the last self-study report that have been met include a significant increase in faculty-sponsored undergraduate research opportunities. These include both stipend-based and volunteer activities and have involved all tenured/tenure-track faculty. It is anticipated that the recent establishment of the campus-supported Program for Undergraduate Research Experiences (PURE) will facilitate the expansion of additional undergraduate research opportunities.

Role Within the University, Role in LACC, & Relationship to Other Programs

The Biology Department is part of the Division of Natural Sciences and Mathematics. In addition to specific major emphases and associated minors, the Biology program supports degree offerings in Health, Education, Environmental Studies, and other science disciplines (e.g., Chemistry). The department also serves the lab science component of the LACC through year-round high-enrollment offerings of a three-course introductory series in biology (BI 101, 102, and 103). On average, 16 sections of lecture and 47 sections of laboratory classes are assigned to the Biology 100 series, with typically all faculty involved in instruction of at least some of the sequence annually. Adjunct involvement in the introductory sequence remains constant. For example, adjuncts taught roughly 47% of the biology 100 series lectures and labs during the 1995-96 academic year, while they are scheduled to teach approximately 48% of these courses for 2006-07. A significant number (approximately 60 - 80) of non-majors also enroll in advanced coursework, including human anatomy and physiology and microbiology, in order to fulfill specific pre-requisites for admission to entry-level professional health science programs in nursing and dental hygiene. Education's K-8 programs are served by a biological methods course (GS 311). Biology degrees also provide excellent preparation for students entering the MAT program to earn initial licensure. In addition to providing specific coursework for other programs, Biology Department faculty work closely with colleagues in chemistry, physics, earth science, mathematics, and education.

Faculty and Staff

Professor: Lonnie Guralnick

Associate professors: Sarah Boomer, Bryan Dutton, Irja Galvan, Karen Haberman, Robert Turner

Assistant professor: Michael LeMaster

Adjunct Assistant Professor: Carla Endres

Adjunct Instructor: Karen Bledsoe

Laboratory Preparator: Piper Mueller-Warrant

Of the seven tenure-track lines in the Biology Department, five are held by faculty hired since the last self-study. This represents one additional tenure-track line since the last accreditation report. New faculty were chosen based on their academic backgrounds and areas of expertise so that established departmental objectives could be met. Changes to the laboratory preparator position include restructuring of duties and a salary increase that allowed the department to hire and retain better qualified candidates.

All tenured and tenure-track faculty hold Ph.D.'s with adjuncts holding a minimum of a M.S. degree. Faculty discipline specialties include animal physiology, biochemistry, cell/molecular biology,

chemical ecology, embryology, evolution, genetics, immunology, invertebrate zoology, human anatomy & physiology, marine ecology, microbiology, plant physiology, plant systematics, and vertebrate zoology.

Students

Other than meeting the University's admission requirements, there are no special application procedures for students who choose one of the biology program emphases. However, students must maintain a minimum a cumulative GPA of 2.0 in courses that are used to satisfy biology degree requirements.

The majority of Biology majors include students focused on pre-professional career objectives (e.g., pre-medicine, pre-dental) followed by students who have not committed to a specific career track. Biology minors are diverse, although the majority partner biology training with majors in Health, Psychology, Chemistry, or Earth Science.

Number of Majors, Minors, and Graduates by Academic Year

Academic Year	Majors	Minors	Graduates
2003-2004	128 (Biology), 177 (Pre-Professional/Science)	25	14
2004-2005	122 (Biology), 140 (Pre-Professional/Science)	34	26
2005-2006	121 (Biology), 98 (Pre-Professional/Science)	not available	29

Although the number of potential majors/minors entering Bi 211 each year remains high (more than 100 for each of the last three years), a significant number of these students are not retained during their first year in the program (Bi 213 enrollment drops, on average, to approximately 62 per year). The department remains concerned about the level of preparedness for college level work for its incoming freshmen and has implemented strategies such as Peer-Led Team Learning (PLTL) to address this issue. Despite poor retention during this foundation series, Biology retention beyond this series is high, as evidenced by our average graduate rate (22 majors and 23 minors per year), nearly triple what it was five years ago.

Examples of Outstanding Student Graduates from the Past Ten Years

The Biology Department recognizes our outstanding students on an annual basis.

Aiello, David	1996	Assistant Professor of Biology, Mercer University
McAllister, Shane	1997	Ph.D./MD to be awarded June 2007, Oregon Health Sciences University
Hamer, Traci	1998	Pharmacy School, Oregon State University
Hockema, Brandon	1998	MS Horticulture, University of Florida
Dumanovsky, Alexey	1999	Medical School, Oregon Health Sciences University
Vognild, Rolf	1999	Physical Therapist; employed in OR
Coverdill, Christopher	2000	Molecular/Genetics Technician, Oregon Health Sciences University
Larios, Ramon	2000	MD, Medical College of Wisconsin
Reese, Susan	2000	MD, San Antonio, TX
Timm, Andrew	2000	Dental School, Oregon Health Sciences University
Ziglinski, Amanda	2000	Middle School Science Teacher, Mt. Angel, OR
Cameron, Andy	2001	Senior Research Assistant, Portland Alcohol Research Center, Oregon Health Sciences University
Cameron, Jessica	2001	Department of Public Health, CO
Crosky, Sarah	2001	MD, Medical College of Wisconsin
Erdman, James	2001	Research Associate, Gene Tools, Corvallis, OR
Hase, Michelle	2001	Research Associate, Gene Tools, Corvallis, OR
Nunan, Laura	2001	Horse Ranch Owner, Monroe, OR
Turley, Brandon	2001	Dental School, Oregon Health Sciences University
Worley, Alissa	2001	MAT, Western Oregon University
Gambee, Luke	2002	Dental School, Arizona School of Dentistry and Oral Health, Mesa, AZ
Garand, Cari	2002	Environmental Educator, Seattle, WA
Johnson, Toni	2002	High School Science Teacher, Salem, OR
Shirley-Smalley, Laurel	2002	High School Science Teacher, AK
Zimmerman, Sheri	2002	Surgical Nurse, Good Samaritan Hospital, Corvallis, OR
Austin, Melissa	2003	Program Specialist, Plant Health Program, Oregon Department of Agriculture
Benek, Rebekah	2003	Physical Therapy, Pacific University

Boschee, Melissa	2003	Horticulturist, Oregon Department of Agriculture
Briggs, Shanna	2003	Medical Assistant, Villa Medical Clinic in Newberg
Estep, Erin	2003	Dental School, Oregon Health Sciences University
Rattray, Rogan	2003	Graduate School - Microbiology/Ph.D. program, Oregon State University
Shipley, Kelly	2003	High School Teacher, McMinnville, OR
Tester, Ann	2003	Douglas County Soil and Water Conservation District, OR
Zamzow, Jennifer	2003	MAT, Willamette University
Bertell, Gabriel	2004	Pharmacy School, Oregon State University
DeClercque, Kevin	2004	Pharmacy School, Pacific University
Keeley, Gail	2004	MAT, Pacific University
Marque Cobb, Molly	2004	Insurance Agent, Farmers Insurance, Monmouth, OR
Patel, Viral	2004	Pharmacy School, Oregon State University
Kha, Linda	2005	Pharmacy School, Oregon State University
Smith, Monica	2005	Graduate Student, Botany, Washington State University
Treharne, Tyler	2005	Pharmacy School, Oregon State University
Fenton, Theresa	2006	Dental School, Oregon Health Sciences University
Howell, Nathan	2006	Laboratory Technician, Salem Hospital, Salem, OR
Manning II, Terrance	2006	Accommodations Coordinator, Diability Services, Western Oregon University
Reznik, Mathilde	2006	Dental School, Oregon Health Sciences University

Resources *(Including Facilities, Technolgy & Budgets)*

The Biology Department's budget is largely augmented with funds derived from allocation of the division's services and supplies budget in combination with laboratory fees. Annual budgets are established by the department head in consultation with the Natural Sciences and Mathematics Division Chair. Expenditures are tracked by the department head with assistance from the laboratory preparator who is also responsible for processing purchase requests. Additional ad-hoc funds have occasionally supplemented the department's budget, especially with regard to equipment purchases (e.g., the Dean's Office, federal grants such as PT3 and OCEPT, and the University's Student Technology Fee). Please refer to supplemental materials for the current departmental budget.

Facilities & Technology

The Biology Department offers the vast majority of its lecture and laboratory courses in the Natural Sciences Building (NS). However, recent enrollment surges in the introductory majors course (Bi 211) have led to utilization of a larger lecture facility in the Smith Music Hall. Of the lecture rooms regularly utilized, three (NS 103, NS 122, NS 215) are equipped with "smart room" technology while all others can be enhanced with mobile laptop computers and multimedia projectors provided through the Division of Natural Sciences and Mathematics.

Five of the seven laboratory rooms regularly utilized by the department have seating capacities of 24. One, designated exclusively for microbiology has a seating capacity of 16. The remaining lab has a seating capacity of 16 and is designated exclusively for human anatomy and physiology. All laboratories are either equipped with, or share, compound light microscopes, dissecting microscopes, and digital microscopes. These labs all have desktop computers (typically one at each lab bench that accommodates four students) and a mobile digital imaging / demonstration "station" equipped with a compound light microscope, a dissecting microscope and a digital camera connected to a stand-alone computer. Many of the laboratory computers are equipped with discipline-specific software (e.g., phylogenetic analysis for Bi 312). All computers are monitored by the laboratory preparator and are maintained by University Computing Services. A computer/software inventory is maintained by the laboratory preparator. Additional program-critical facilities include a sea table housed in NS 203, cadaver tanks located in NS 006, and a green house situated on the roof of the Natural Sciences building. Please refer to supplemental materials for a complete equipment inventory.

One important consequence of limited physical space is the regular use of teaching laboratories by faculty conducting research. The ensuing conflicts frequently necessitate inconvenient/inopportune research schedules. These conflicts typically have negative impacts on potential undergraduate student collaborators who are either unwilling or are unavailable at these times (e.g., weekends, early-/late-mornings). Furthermore, space and equipment constraints sometimes compromise course scheduling and effective laboratory instruction.

SWOT Overview & the Future

Three Primary Strengths

The Biology Department defines its three primary strengths as follows:

1) Biology faculty provide personal contact with students via small courses, labs, and independent research opportunities.

2) all Biology majors complete a broad and thorough set of core classes featuring solid and meaningful lab experiences designed and taught by Biology faculty.

3) our program fulfills important service to non-majors via a rigorous lab-based liberal arts foundation series and advanced coursework for pre-nursing and pre-education students.

Action Plan for Maintenance:

1) regular department meetings and retreats where course objectives and our program's mission are regularly discussed and evaluated. In addition, continued faculty representation in campus-wide initiatives such as PURE.

2) continued and increased financial support for lab-based courses.

3) continued evaluation of, and concomitant changes to, our curriculum. For example, planning for the addition of a nursing-program, offered in collaboration with OHSU.

Three Primary Challenges

The Biology Department defines its three primary challenges as follows:

1) retention of students beyond the freshman year which remains the most serious and ongoing test to the program and its faculty, including:

i. insufficient resources for ongoing retention efforts (e.g., recruitment and retention of adequate numbers of PLTL leaders)

ii. preparedness and placement of incoming students

2) enrollment pressures, both over-enrollment and under-enrollment, related to:

i. an increasing number of Biology majors who are focused on pre-health professional training

ii. cancellation of low enrollment courses due to budget cuts has adversely impacted timely graduation, retention of adjuncts, and diversity of course offerings

iii. anticipated establishment of a nursing program in collaboration with OHSU

3) increased expectations placed on Biology faculty, due to:

i. additional recruitment and retention-based remediation efforts

ii. new assessment activities

iii. greater emphasis on scholarly activities

iv. increased numbers of advisees

v. decreased university support (e.g., termination of support staff positions and motor pool)

Action Plan for Initiating Change:

1) continuing and increasing efforts such as PLTL to better assist students, especially incoming freshman, as they transition to college-life and college-level coursework expectations.

2) obtaining additional FTE for addressing chronically over-enrolled courses; earlier student-advising to direct students into required, emphasis-specific courses.

3) devising a more equitable workload formula (e.g., hour for hour credit for laboratory-based courses which is currently 0.66:1, extraordinary advising assignments, research mentoring).

Looking Ahead to the Future

Given observed trends since the last self-study report, the Biology Program anticipates providing its rigorous and broad curriculum to an increasing number of majors and non-majors via innovative courses and lab-based experiences. In revising our degree emphases and minor options, faculty not only hope to better serve our significantly expanding pre-health science professional majors but also to attract and better prepare a more diverse array of majors in specific sub-disciplines (e.g. zoology, botany, molecular/cell biology etc.).

While the department has made significant improvements in supply budget, technology, and assessment, the challenges of retention and increasing expectations on faculty for non-teaching service all represent long-term themes that continue to impact our ability to prioritize and implement broader planning. Strong faculty commitment to novel curriculum development, retention and remediation programs like PLTL, and research and outreach activities represent intrinsic capabilities for both fulfilling basic mission objectives and larger visions for the future. However, the degree to which faculty can successfully execute these goals is directly related to a number of extrinsic factors that can only be addressed through administrative and policy decisions such as the assignment of FTE for labs, independent research projects and advising, the recruitment and selection process, and the increasing numbers of both majors and non-majors.

Unit Assessment Plan

Primary assessment contact: Karen Haberman

I. Statement of unit mission.: The Biology Department prepares students for careers in biology and science education, and admission to graduate and professional schools in the life and health sciences. We also promote the understanding of biology as an essential part of a liberal arts education and of global citizenship

II. Unit intended objectives/outcomes:

a. Students will understand key concepts from the many disciplines within the biological sciences.

b. Students will engage in laboratory experimentation, data analysis and interpretation, and critical thinking at all course levels.

c. Students will have opportunities to augment their coursework experiences with advanced studies and research within areas of particular interest.

1. Academic Affairs Goal 2:

a. Increased student retention in 100 and 200 series level biology courses.

b. Increased proficiency of biology majors in key concepts from the many disciplines within the biological sciences

c. Increased critical thinking for students enrolled in Biology LACC courses.

d. Biology will improve its advising for students preparing to enter professional or graduate school.

e. Improved alignment of program objectives with course offerings.

2. Academic Affairs Goal 3:

Not applicable at the department level.

3. Academic Affairs Goal 4:

a. Biology will generate a "master plan" identifying instructional, technological, and communication needs in supporting a campus-wide effort (e.g., "Smart Rooms" needed, renovation / remodeling needed).

4. Academic Affairs Goal 5:

a. Biology faculty will serve as a resource to the surrounding community, region, and state.

Of the objectives above, this unit will assess _1a-c, e_ in the current assessment year; and _1a-e__ in the next one.

III. Tactics for achieving the objectives:

1.

a. Biology will continue to offer its Peer-Led Team Learning (PLTL) program in an attempt to increase retention.

b. Biology will continue to administer the Educational Testing Service's Biology Major Field Test in order to evaluate student proficiency.

c. Biology will continue to administer a pre-/post-test for the Biology LACC (i.e., 100 series) courses.

d. Biology is developing a comprehensive process which will include advising sessions and materials for students planning to enter specific professional or graduate programs.

e. Alignment of program objectives with course offerings (see table below).

Program student learning outcomes	Courses that have no contribution to learning outcome (all courses have a "Bi" prefix)	Courses that have minimal contribution to learning outcome (all courses have a "Bi" prefix)	Courses that have moderate contribution to learning outcome (all courses have a "Bi" prefix)	Courses that have extensive contribution to expecting mastery of learning outcome (all courses have a "Bi" prefix)
Understand key concepts from the many disciplines within the biological sciences.			101,102,103,234, 235,236,318	211,212,213,311,312,313,317,321,324,326,330,321,334, 335,336,357,360,361,370,371,431,432,434,435,437,441/541,451,453/553, 454/554,458/558, 461/561,474,475 *Note that it is by taking the 200 and 300 sequences, as well as a suite of upper-division courses, that this objective is met for majors!
Engage in laboratory experimentation, data analysis and interpretation, and critical thinking at all course levels.				All of our courses do this. Mastery is expected at the level appropriate to the course. Note that all courses except 458/558 include a separate lab or discussion
Have opportunities to augment their coursework experiences with advanced studies and research within areas of particular interest.**	101,102,103 234,235,236 334,335,336 318		317,324,360,361,370,371,431,434,435,437,441/541,451,453/553,461/561, 474	313,321,326,330,331,357,406,407/507,408,409,424,432, 454/554,458/558

**By definition, this third goal goes beyond coursework. However, we have ranked courses in terms of their potential in serving as jumping off points for for further research by students.

2. n/a

3.

a. Faculty will create a prioritized list of instructional, technological, and communication needs for the department as it pertains to the mission of the university.

4.

a. i. Biology will continue to support the Natural Science Club; ii. Biology will continue to support innovative outreach programs (e.g., PLTL, NSM Careers Day, Teacher Outreach program, High School cadaver tours, Junior Science and Humanities Symposium, Natural Science Seminars, WAMS).

IV. Basic approach for assessing our unit intended objectives/outcomes

A. BENCHMARKS FOR SUCCESS:

1a. Biology will continuously assess survey and retention data in an effort to understand patterns of student retention in Biology 102, 103, 212, and 213.

1b. Biology will compare the ETS exam results to data from previous years and national averages and will attempt to establish criteria for desirable outcomes.

1c. Biology will compile data from all years the pre-/post-exams have been administered in order to establish criteria for desirable outcomes.

1d. Biology will monitor rates of our graduates' acceptance into graduate/professional programs and will establish criteria for desirable outcomes.

B. RELEVANT QUANTITATIVE AND/OR QUALITATIVE EVIDENCE:

1. Evidence for Objective 1 (1a.): i. results of the PLTL attitudinal survey developed by the Biology Department; ii. retention data (see supplemental materials below)

2. Evidence for Objective 2 (1b.): i. results from the nationally administered ETS Major Field Test in Biology; ii. examine how other institutions utilize these data (see supplemental materials below)

3. Evidence for Objective 3 (1c.): i. results of the pre-/post-tests developed for each of the Biology LACC courses by the Biology Department; ii. examine how other institutions utilize these kinds of data (see supplemental materials below)

4. Evidence for Objective 4 (1d.): acceptance data from professional/graduate schools and assessment of our performance with respect to our comparator institutions

C. MISCELLANEOUS DATA COLLECTION ISSUES:

1. Identifying students that should be taking the ETS exam has proven difficult. The Biology Department, working in collaboration with the Registrars Office, is working to implement measures that will facilitate early identification of these students. It is hoped that these measures will ultimately lead to greater participation in this assessment tool.

2. A stable source of funding for assessment instruments, external to the department, needs to be secured.

D. ANALYSIS & INTERPRETATION OF EVIDENCE

As indicated above, the department is in the process of analyzing and interpreting the results from our various assessment instruments in an effort to:

1. understand patterns of student retention in both our introductory non-majors and majors sequences (i.e., Bi102/103 and Bi 212/213),

2. establish criteria for desirable outcomes based on the ETS exam results,

3. establish criteria for desirable outcomes based on the pre-/post-exams results from the introductory biology sequence, and

4. monitor rates of our graduates' acceptance into graduate/professional programs and establish criteria for desirable outcomes.

E. RESULTS AND REPORTS

As results, analysis, and interpretation are compiled from our various assessment instruments, they will be included in annual departmental reports that are submitted to the division chair and dean of LAS. However, major obstacles in conducting these assessments and producing subsequent reports are the lack of faculty release time and insufficient data-gathering mechanisms/support.

F. FOLLOW-UP AND CONTINUOUS IMPROVEMENT: THE FEEDBACK LOOP

Programmatically, the biology department is positioned to implement a more effective "feedback loop" through ongoing assessment activities. It is anticipated that these assessment strategies, in combination with our regular departmental meetings and retreats, will result in increasingly more evidence-based decisions regarding program challenges and maintenance.

List of Supplemental Materials

Bi 101 pre-/post- test results

Bi 102 pre-/post- test results

Bi 103 pre-/post- test results

Biology Department budgets

Biology Department inventories of equipment, software, and consumables

Educational Testing Service (ETS) Major Field Test results

Outstanding Biology Program Graduates

Peer-Led Team Learning attitudinal survey results