

**EASTERN OKLAHOMA STATE COLLEGE  
PROGRAM REVIEW 2017  
LIFE SCIENCE**

1. REVIEW PROCESS

Patricia C. Bolin Ratliff, Chair, Department of Biology

2. NAME OF PROGRAM

Life Science; Program code 005; HEGIS code 0401; CIP code 260101

3. CENTRALITY OF THE PROGRAM TO THE INSTITUTIONAL MISSION

Eastern Oklahoma State College is organized to generate student learning through its associate degrees and other academic programs that effectively prepare graduates to complete baccalaureate or other program degrees, obtain productive employment, and lead enriched lives of learning. It is simultaneously the mission of the College to engage in educational programming and related activities that promote regional economic and community development. The Life Science program is designed to meet the needs of the individual student, in keeping with the mission of the College as defined by the Regents of Eastern Oklahoma State College and as stated above.

The basic curriculum of the Associate of Science degree in Life Science contains the traditional freshman and sophomore courses for students who wish to complete the four-year degree in a number of biology-based majors and allow students to enter the four-year college as a junior. The curriculum also contains courses that are required in the General Education portion of many students' degree plans, and specific courses required in other degree plans (such as agriculture) offered by Eastern. Additionally, courses in the curriculum support the Associate of Applied Science degree in Nursing offered at Eastern.

4. TYPE OF DEGREE

Associate of Science in Life Science

5. GOALS AND OBJECTIVE OF DEGREE PROGRAMS

Students successfully completing the Life Science program at Eastern should be prepared to enter a four-year college or university at the junior year level, focusing on the biological sciences, as they prepare their post-graduate degree programs at schools of Medicine, Dentistry, Pharmacy, Physical Therapy, Nursing, Occupational Therapy, Speech and Language Pathology, Pharmacy, and Veterinary Medicine. The program also prepares students for entry into a number of specialized health programs, both at the Associates and Bachelor levels, such as Radiology Technician, Respiratory Therapy, Dental Hygiene, Physical or Occupational Therapy Assistant, and Medical Laboratory Technician. The program should also develop the knowledge and technical skills needed in the study of sciences and other academic disciplines. The curriculum will provide students the opportunity to reach a level of superior skills in Anatomy, Physiology, Microbiology, Nutrition, Botany, and Zoology. The curriculum will also enhance students' critical thinking and quantitative reasoning skills.

6. FACULTY AND QUALIFICATIONS

- Bolin Ratliff, Patricia (2008) Professor of Zoology, Biology Department Chair, Ph.D. 1998, University of Minnesota
  - Collins, Julie (2006) Professor of Biology, Ph.D. 2003, Oklahoma State University.
  - Green, Andrea (2013) Professor of Biology, Ph.D. 2013, University of Arkansas
  - Juarez, David (2008) Professor of Biology, M.S. 2002, East Central University
  - McAllister, Chris (2010) Professor of Biology, Ph. D. 1989, University of North Texas
- One adjunct faculty is typically employed in a given year.

7. RESOURCES

- A. Financial An annual budget is prepared each year to meet the financial requirements of the Life Science program.
- B. Library The Eastern Oklahoma State College library maintains books, periodicals, and electronic media resources for students use in support of their curricular requirements.
- C. Equipment The Life Science program uses computers with appropriate learning software and ancillary equipment, printers, classroom projection systems, Promethean ActivBoard and ActivInspire student response systems, microscopes, and other laboratory based equipment. In addition, the science labs provide students with hands-on manipulation of preserved animals, microbes, and cellular processes.
- D. Support services Students are supported in their efforts by a number of campus-based services. Computer labs are available for research, report writing and tutorial assistance. Tutors are hired through work study and RCE programs. The Phi Theta Kappa honorary fraternity and the Presidential Scholars Program provide student tutors on a volunteer basis. Professional and peer tutors are available through the Student Support Services (TRIO) program based on the Wilburton campus. Tutoring assistance is available from Tutor.com without cost to the students. Students may obtain assistance in any courses from instructors outside of class at regularly scheduled office hours or by appointment.

8. FACULTY/STUDENT RATIO

Credit courses

- General Zoology Lecture and Lab 1/20
- Human Anatomy Lecture 1/40
- Human Anatomy Lab 1/20
- Human Physiology Lecture and Lab 1/20
- Microbiology Lecture and Lab 1/20
- Nutrition Lecture 1/30
- Botany Lecture and Lab 1/20

In order to meet the 21-25 credit hours in their Major Area, Life Science majors must also take several of the following courses primarily from the Science and Math Division. The specific courses selected from this list depend upon the career path chosen by the student.

- CHEM 1415 Chemistry II
- CHEM 2105 Organic Chemistry I
- CHEM 2205 Organic Chemistry II
- MATH 1613 Trigonometry
- MATH 2633 Elementary Statistics
- MATH 2235 Calculus I
- NURS 2123 Medical Terminology
- PHY 1114 General Physics I
- PHY 1214 General Physics II

9. NUMBER OF MAJORS\*

YEAR	HEADCOUNT
2010	108
2011	97
2012	103
2013	92
2014	77

*\*As reported on the State Regents Productivity Report*

Some students declare a General Studies major in which to complete the requirements for an AS degree but have a life science career choice and complete at least 18 credit hours of the life science courses. These are not counted in the above table.

10. INSTRUCTIONAL COST

The estimated cost of instruction of the Life Science majors per FTE enrolled in the specialized courses is \$ 1,784

11. NUMBER OF FULL-TIME EQUIVALENT FACULTY

There are 4 full-time-equivalent faculty members in this program.

12. SUCCESS OF TRANSFER STUDENTS

The majority of Eastern students that complete this program transfer to University of Oklahoma, Oklahoma State University, Northeastern University, and East Central University based on surveys of graduating students. At the time of review, there is no formal information available about the success of our former students. However, graduating student contact information has been collected and additional surveys will be done in the near future.

### 13. METHOD OF CURRICULUM REVIEW AND EVALUATION OF PROGRAM

Faculty developed 15 learning outcomes, below, and devised a timeline for assessing student achievement of these outcomes. Student performance was directly assessed over Spring 2016, Fall 2016, and Spring 2017 semesters. Student performance was directly assessed in a number of ways, such as test questions, assignment results, and rubrics. Students were also indirectly assessed in the Spring of each semester, though only May 2016 results are reported here. In this indirect assessment, graduating Life Science majors were given an anonymous survey asking how well they feel they accomplished each of the learning outcomes and in which courses they learned/used the learning outcome listed. In addition, permanent email addresses were collected so that these students could be surveyed in the future about their university/job experiences following their matriculation from Eastern.

#### **Assessment Results**

The following table contains the results from both direct and indirect assessment of the Life Science Major Learning Outcomes. The first line of each learning outcome contains the results from direct assessment, with the method assessed, the number of students assessed, and their performance on meeting this learning outcome. The next line contains the indirect assessment information for the same learning outcome. We are reporting the May 2016 results only, where 13 out of 15 graduating life science majors completed this survey. Each question was followed by a 1 - 4 (Strongly Agree to Strongly Disagree) Likert scale, with most questions asking which courses helped them meet this outcome.

Learning Outcomes for the Life Science Major, and results of both Direct and Indirect Assessment.

Learning Outcome	Method of Assessment	Number of Students Assessed	Mean (STD) Indirect Survey	% Achievement Direct Assessment
1. Students will be able to apply biological knowledge to solve problems in their everyday lives.	Indirect Survey	13	1.08 (0.28)	
2. Students will be able to demonstrate knowledge of the scientific method	Test, assignments	47		81.7%
	Indirect Survey	13	1.00 (0)	
3. Students will be able to apply the scientific method to solve biological problems	Research project and paper	25		84.8%
	Indirect Survey	13	1.08 (0.28)	
4. Students will be able to demonstrate mastery of basic biological content.	Test, assignments	69		87.6%
	Indirect Survey	13	1.08 (0.28)	
5. Students be able effectively find and use resources from primary literature	Assignments	46		97.7%
	Indirect Survey	13	1.31 (0.48)	
6. Students will demonstrate effective communication of underlying principles of biology using (1)oral, (2) written, (3) visual e.g. Poster, PowerPoint or demonstration	Rubric	29		91.7%
	Indirect Survey	13	1.15 (0.28)	
7. Students will be able to demonstrate mathematical knowledge and skills in biological sciences	Assignments	25		89.8%
	Indirect Survey	13	1.08 (0.28)	
8. Students will be able to correctly use a microscope to locate and identify biological specimens and their parts	Rubric	54		94.8%
	Indirect Survey	13	1.08 (0.28)	

Learning Outcomes for the Life Science Major, and results of both Direct and Indirect Assessment, continued from previous page.

<b>Learning Outcome</b>	<b>Method of Assessment</b>	<b>Number of Students Assessed</b>	<b>Mean (STD) Indirect Survey</b>	<b>% Achievement Direct Assessment</b>
9. Students will be able to describe and practice laboratory safety guidelines relating to working with chemicals, microorganisms and or dissection	Rubric, test	26		96.9%
	Indirect Survey	13	1.00 (0)	
10. Students will be able to work well independently and in small groups, showing self-direction and motivation and contributing to group work	Rubric	78		90.9%
	Indirect Survey	13	1.00 (0)	
11. Students will be able to interpret graphical quantitative information AND 12. Students will be able to graph quantitative information	Assignments	24		89%
	Indirect Survey	13	1.15 (0.38)	
13. Students will be able to demonstrate critical thinking processes as well as problem solving skills	Assignments	9		88.7%
	Indirect Survey	13	1.00 (0)	
14. Students will be able to apply ethical principles of the discipline in regard to human and animal subjects, environmental protection, use of sources, and collaboration with colleagues	Rubric	56		99.1%
	Indirect Survey	13	1.00 (0)	
15. Students will be able to legally (copyright) and ethically (plagiarism) retrieve and utilize information confidently, technology appropriate for biological sciences	Rubric	56		94%
	Indirect Survey	13	1.00 (0)	

The results of the direct assessment clearly demonstrate that the Life Science Majors are achieving the Life Science Learning Outcomes developed by the Biology Department faculty. Students achieved each outcome with average scores of 81.7 to 99.1%. Students excelled (scores > 90%) at more than half of the Learning Outcomes. The lowest percentage was in the knowledge of the scientific method, a surprising outcome given how much this concept is reinforced in the freshman-level courses. The results were taken from an assignment in Botany and from a final exam question in Zoology; the measure of how well Zoology students understand the scientific method should be reevaluated for the next assessment. The General Zoology students are required to conduct scientific research during the course, which might explain the increased ability of those students to apply the scientific method (84.8%).

The indirect assessment asks students to rate themselves on how well they know and can demonstrate the learning outcomes, using a Likert scale with 1 being Strongly Agree to 4 being Strongly Disagree. Here, students clearly feel they have mastered the Life Science Learning Outcomes given that no average score is greater than 1.31. The Learning Outcome with this higher mean addresses the ability of the students to access primary literature. Discussions among the science and math faculty following these results address the language issue – do students understand what is meant by “primary” literature? In at least one of the assessed courses (General Zoology) following the May 2016 results, the instructor made a point of defining primary, secondary, and tertiary literature, and then repeatedly referred to primary literature throughout the course. Surveys from May 2017 are not yet available to determine if this change made a difference in the self-assessed scores from the Life Science students.

The curriculum is continually reviewed by instructors. This evaluation includes comparison of course content with other instructors in the state at various professional meetings, and by reviewing the newer texts available in the courses. The program content is reviewed by evaluating what is expected of the student at various transfer institutions. The results from the Direct and Indirect Assessments are used by the biology faculty to assure that students are achieving the Learning Outcomes set by the faculty. Additionally, planned surveys with past students will be used to gauge the effectiveness of the individual courses in preparing the student for courses taken at the transfer institutions.

15. NUMBER OF GRADUATES IN PAST FIVE YEARS\*

<u>YEAR</u>	<u>NUMBER OF GRADUATES</u>
2010	13
2011	14
2012	19
2013	8
2014	8

*\*as reported on the State Regents Productivity Report*

16. NUMBER OF CREDIT HOURS IN DEGREE PLAN

<u>PLAN DIVISIONS</u>	<u>NUMBER OF CREDIT HOURS</u>
In Program	62-66
General Education	40
Major Area	21-25
Supporting Electives	1-3

17. RECOMMENDATIONS

The primary challenge faced in the Life Science program is declining numbers of students who declare this as a major. Certainly, the demand for health careers remains high, and this program of study starts their preparation for such careers. However, the program requires a minimum of 21 hours within the Major Area and it also requires that they take General Zoology instead of the non-science-majors General Biology, the latter of which many have taken. Often, students do not want to stay an additional semester to earn another 3-4 credits in the Major Area or take General Zoology, and by switching their major to General Studies, they can graduate with their AS degree sooner. A recommendation, then, would be to examine the courses taken by General Studies students to identify those that have taken the majority, say, 18 hours within the Major Area and “count” those students in the graduating list plus include them in our Direct and Indirect Assessment procedure.

Another challenge faced is changes that occur within the Nursing Program at Eastern. While many of the courses taught by the Biology faculty are part of the Life Science major, we also teach a number of the pre-nursing sciences, such as Anatomy, Nutrition, Human Physiology (Nursing Emphasis), and Introduction to Microbiology. In fact, most of our student enrollment is toward the AAS in Nursing. Any changes to the nursing program directly affect the number of students we have in these courses, with Anatomy and Nutrition serving both the Life Science and the Nursing Major. This coming year, the Nursing Division suspended their freshman nursing program at the Idabel McCurtain County campus due to low enrollment. The result was the loss of the full-time biology position in Idabel. This position also taught the Life Science major courses of General Zoology and Human Physiology (Science Emphasis). Given that the Nursing Division plans to increase enrollment, teaching those courses must continue, but teaching with adjunct faculty is not acceptable. It will be difficult to find instructors who are as qualified as they need to be for these highly technical courses and who are willing to work for the adjunct hourly pay. A recommendation would be to keep one full-time science position available on the Idabel campus, regardless of enrollment numbers, to adequately prepare students for when the Nursing program resumes and to continue to prepare students in the Life Science major.

As always, budgetary concerns loom for all divisions on campus, not just the Biology Department. Thankfully, due to careful spending on the part of the faculty and staff, we have been able to extend the decreasing budget allotment to replace expendable items (e.g., preserved animals and animal organs for dissection, bacterial cultures, laboratory supplies such as Petri dishes and microscope slides, etc.) as needed for student laboratory sessions.

- However, equipment such as microscopes and physiology electronics are aging and need to be replaced.
- The physiology laboratory space on the third floor of Sullivan Hall was not designed for physiology lab exercises and needs to be remodeled.
- Despite the request that microbiology and chemistry laboratory sessions be taught on the McAlester campus, renovations would have to be made to the science lab space (second exit, gas line supply, properly exhausted fume hoods).
- The Life Science faculty are scientists and as such need to keep up-to-date on changes in their respective fields, and yet there is not sufficient money to travel to annual national conferences for updates and collaborative work with colleagues.

While the overall budget issues will not be resolved easily, a recommendation would be to increase grant funding to obtain the necessary funds to address these issues. A grant writer with an eye out for such funding opportunities would be a useful addition to Eastern.