

2011-2018 IBHE Program Review

PROGRAM REVIEW REPORT

1. **Reporting Institution** ___Eastern Illinois University_____
2. **Program Reviewed** _____B.S. Biological Sciences_____
3. **Date** ___December 15, 2018_____
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5. Overview

The primary mission of the Department of Biological Sciences is to provide an exceptional educational experience to both undergraduate and graduate students as well as embrace the university mission of diversity, inclusion and a student-centered culture. This mission is achieved by maintaining small class sizes staffed by full-time faculty and offering courses that have a laboratory component that facilitates participatory learning. Our Department currently has 15 tenure track faculty, 6 annually contracted faculty (ACFs), and 3 academic support professionals (ASPs). The ACFs primarily instruct non-majors courses for 350 students per semester. Tenure-track faculty instruct the approximately 400 biology majors, with a broad assortment of courses. The core curriculum in the biological sciences provides students with a diverse range of subject courses and individual attention that strengthens communication, quantitative, and analytical skills. In addition, curricular concentrations offer the option of specialization leading to employment upon graduation or preparation for postgraduate education. The department encourages its faculty to engage in scholarly activity and advocates research publication and the acquisition of extramural funding. Scholarship enhances the stature of the Department and the University, adds current information to lecture material, and helps to secure technologically advanced laboratory equipment for the classroom. In addition, research-active faculty provide opportunities for students to participate in new and ongoing research projects under the guidance of a scientist-mentor. The department also serves the University by maintaining the high quality of pre-professional programs and supporting course work in general education as well as other disciplines. The department remains focused on maintaining its long-term strengths in organismal biology/ecology/environmental biology while bolstering its expertise in cellular molecular biology and sustainable energy. The Environmental Biology major option remains strong, and an interdepartmental Neuroscience major was approved in 2017. The department promotes training and scholarship by faculty and students. For example, in FY15 alone, faculty received 36 awards, graduate students 38 awards, and undergraduates 35 awards, with most these related to research efforts (training, conference presentations). Approximately 60 students are involved in undergraduate research each semester, and the department has an average of 50 publications each year, most with student authors. The Department excels in integrative learning, one on one interaction with students, and its ability to maintain exceptional expertise in organismal biology while

keeping up with the latest techniques in cell and molecular biology in both teaching and research. External funding has remained strong with new and yearly grants ranging from \$0.8-1.2 (2018 grants total ~\$0.8.M).

6. Major Findings and Recommendations

- a. **Description and assessment of any major changes in the program/disciplinary context, e.g., (1) changes in the overall discipline or field; (2) student demand; (3) societal needs; (4) institutional context for offering the degree; (5) other elements appropriate to the discipline in question; and (6) other.**
 1. **Changes in Discipline:** The field of biology has become increasingly integrative and has shown a rapid increase in molecular approaches. Therefore, employers and professional schools have increased expectations of students trained accordingly. Concurrently, jobs in the field of sustainability are also growing as well as other jobs in the environmental sciences. The Department has adjusted its curriculum accordingly to the demands of the environmental professional field as it expands from basic ecology and resource management to a more technology-based job market.
 2. **Student Demand and Success / Societal needs:** According to the Bureau of Labor Statistics, nearly all sub disciplines of biology are expected to have growth over the next decade (e.g. zoologist/environmental biologists 8%, ecologists 11%, biology technicians 10%), with health careers expecting more robust growth, from 13% (Physicians, Clinical Scientists) to >30% (Physical Therapists, Physician's Assistants). The former normally require only a BS degree for job placement. Of the approximately 400 biological science majors, 80% are pre-health, 3% are teacher certification, 10% are environmental biology (EVB), and the remainder are in the other biological sciences disciplines. Our society continues to embrace sustainable technologies, and the EVB major has maintained about 40 students over the past decade in this major.
 3. **Enrollment issues:** The number of BIO majors has decreased by ~30% since the 2011 IBHE program review, with a drop of ~41% in overall EIU enrollment over this period. The Department faced a reduction in faculty of 40% (from 35 to 21) since 2011, which included a 40% reduction (26 to 15) in tenure track faculty through a combination of faculty retirements and faculty leaving for other positions.
 4. **Program Productivity:** Program costs compared to 2011: BIO major costs per SCH has increased from \$137 to \$164; Departmental (all bio courses) cost per SCH has increased from \$107 to \$142; Gen ed enrollment in BIO courses has decreased from 7,241 SCH to 2,196 SCH (a 70% reduction); BIO major enrollment has decreased from 6,340 SCH to 5,306 SCH (a 16.3% decrease); Number of degrees awarded annually has remained fairly constant (ranging for 57 to 81, with 75 in 2018); The number of minorities has remained constant at 24-26%; The female student population has remained the same (69%); Faculty numbers have decreased by 13 FTE since 2011 (from 35 to 22 FTE, a 40% reduction). Comparative costs per credit hour in discipline compared to 11 other Illinois institutions: Lower division: Average =\$333 / EIU BIO= \$288) 16% less than average; Upper division: Average=\$398/ EIU BIO= \$405 (2% more than average). The overall cost pre SCH is consistent with the Illinois average (Average=\$407/ EIU BIO= \$405)
 5. **Interdisciplinary Programs:** In 2011, EIU dismantled an out-of-date coal heat generation plant and replaced it with a Renewable Energy Facility (REC). The new REC presented an

opportunity for students and faculty to study sustainable practices first hand and resulted in the creation of the MS in Sustainable Energy program and the Environmental Sustainability minor. This resulted in the hiring of a new faculty member to meet the demands of these programs for our Department. The Department was also involved in the establishment of a GIScience Center at the College level to promote even more research and outreach opportunities. Student interest in GIS as a research tool led to the creation of a GIS Certificate program in 2012. In 2017, the Departments of Biological Sciences and Psychology jointly initiated a new Neuroscience major in response to a greater interest by students in this field.

6.b Description of major findings and recommendations, including evidence of learning outcomes and identification of opportunities for program improvement;

1. Assessment results

Exit interviews indicated our strengths to be: faculty knowledge, organization, helpfulness and attitude (>85% agree or strongly agree). However, laboratory exercise appropriateness and availability of up-to-date facilities have dropped from ~80% to 64% since 2011), primarily due to an inability to update labs and purchase equipment. Academic advising, career choice helpfulness, helpfulness of BIO faculty in career choice, and support for undergraduate research have been average.

From our FY17 graduating student exit survey (87 completed): 66% of our graduates have participated in at least 1 semester of undergrad research; 1/4 of our graduates have presented at conferences; roughly 1/3 plan to join the workforce, 1/3 plan on attending graduate school and 1/3 plan to enroll in a health professional school; 46% of our graduates have been accepted to a job, graduate program, or professional school prior to graduation.

Our student learning objectives are found below with a brief explanation of measures and results:

1. Students will demonstrate the ability to perform basic laboratory techniques. *Results through exit surveys and core course grades indicate that this objective was fulfilled.*
2. Students will demonstrate the ability to conduct a research project using scientific principles and methods, then interpret their results in terms of current theories and issues in the biological sciences. *Exit surveys show that the objective was fulfilled: 51 of 84 (60%) of seniors conducted independent research, and 40% of seniors had presented at a conference, and >60 students are engaged in research each academic semester.*
3. Students will demonstrate an ability to write effectively. *Electronic Writing Portfolio ratings indicate that this objective was not met, though scores were the same as the average for the College of Sciences.*
4. Student will enhance global citizenship by participation in biology clubs with conservation and/or volunteer efforts. *Exit surveys show that the objective was fulfilled with >50% of BIO majors involved in science club activities.*
5. Students will demonstrate the quantitative and analytical skills to analyze data sets generated by biological experiments and surveys. *Watson-Glaser were the substantially above the EIU mean of 25.2; reduced number of course laboratory finals in recent years have made this assessment tool less valuable.*
6. Students will demonstrate the ability to critically read and evaluate research papers and review articles in the biological sciences. *Results indicate through grades on capstone research paper that objective was met; 94% of students earned grades of C or higher on BIO 4984 capstone term paper. This course was merged with ecology in 2017 and no longer serves as an assessment tool.*

7. Students will demonstrate the ability to speak effectively. *Results indicate through grades on capstone research paper that objective was met; Student scores were substantially higher than the College of Science average for speech class (BIO= 3.21, COS=3.08) and Senior Seminar (BIO=3.89, COS=3.72 EIU= 3.69.)*

8. Research experience will increase student desire to attend graduate school. *Results through exit surveys indicate that 78% of individuals agreed; objective was fulfilled.*

9. At least 50% of students will be accepted into a graduate program or professional school prior to graduation. *Results through exit surveys indicate that 50% of individuals with a desire to enter a program were accepted*

2. Changes due to Assessment

Faculty hires- With the impact of molecular biology on many field of biology, recent faculty hires for both replacement and new positions have included individuals with molecular research interests as well as maintaining the organism strengths of the department and tying into sustainable energy efforts at EIU. This has included the hiring of a wildlife biologist, animal physiologist, and a plant geneticist, with a molecular microbiologist search currently in progress. The reduction of tenure track faculty in the department (from 26 in 2011 to 15 in 2018) has resulted in the loss of much expertise in sub disciplines. We have responded by hiring faculty with broad backgrounds to cover core coursework as well as provide coursework in sub disciplines. Examples include an animal physiologist with herpetology expertise, a plant geneticist with plant physiology background, and a faculty member with both sustainable energy and molecular biology training.

Academic advising- As described above, exit surveys identified a lack of helpfulness by academic advisors. In response, a professional pre-health advisor was hired in 2008. However, student ratings did not improve in this category, despite several changes made over the past years. This position was not refilled in 2016 due to budget issues, with the Chair and Associate Chair taking over most advising duties. This individual advises our >400 pre-health majors. A course rotation list, fillable PDF checklists, and electronic scheduling allow students to prepare for advising sessions and track their college careers electronically.

Career choice helpfulness- Exit surveys identified a lack of helpfulness of BIO faculty in career choice. In response, the course Biology Forum (BIO 1150) was added to the BIO core curriculum in fall 2007. Content of this course has since been expanded to include presentations by professionals from several biology sub disciplines and health fields as well as faculty presenting research opportunities, as well as career outlook assignments. Also, a new course, Clinical Rotation was introduced in 2015 to provide pre-health students with much needed clinical experience through the local hospital. This course provides both clinical hours as well as in class group-based learning.

3. Retention rates – Of the 600 Biological Science majors (which are evenly distributed between FR/SO/JR/SR), about ¼ are pre-nursing and therefore, by definition, not graduate with the degree as they will move on to nursing school. The roster for seniors include students who have not graduated up to 5 years after their expected date, thus inflating those numbers. We have approximately 100 seniors in good standing in any one year and approximately 70 graduating in their senior year. As we develop a more holistic assessment approach, understanding our retention rates and quantifying them is a primary goal.

4. Undergraduate research support- Exit surveys regarding aspects of undergraduate research showed ~80 % positive comments in several categories. Undergraduate research experiences have remained strong, with ~ 60 students engaged in faculty-mentored research

projects each semester of the academic year. Students gave a large number of both oral and poster presentations and regional and national conferences. In the past year alone, undergraduates received 18 internal research awards. Students participating in internships also showed a strong preparedness for graduate school and on-site supervisor support. External funding for research efforts ranged from 1.1M in 2011 to \$0.8M in 2017.

5. Opportunities for improvement

The re-sizing of EIU provides an opportunity to reevaluate our programs and focus on strengths and continue to adjust curriculum as needed to meet the demands of our student population. Five objectives are being pursued to enhance assessment and curriculum: 1) Establish e-mail group/social platforms to increase alum interactions, 2) unify the curriculum to define disciplines, 3) reinvigorate Integrative biology into the curriculum, 4) use the IDEA (Integration, Discovery, Environment, Application) theme to make the curriculum more cohesive, and 5) institute a capstone course.

6c. Description of actions taken since the last review, including instructional resources and practices, and curricular changes;

Curricular changes-

Several changes have been incorporated into the biology curriculum in response to recommendations made the 2010 CUR review. A recommendation was made to reduce the size of the biology core to allow more flexibility for students to pursue interests in sub disciplines. In response, the Department has made several significant changes to the curriculum to better meet the needs of our student population. This includes the introduction of an Anatomy I and II course sequence, changing a three-semester introductory biology sequence to a two-semester sequence, modifying the calculus requirement, merging 2 biology core courses and expanding medically-related coursework.

Instructional Resources and Facilities Improvement- Since the 2011 IBHE review, the following improvements have been made, including 1) replacement of 10 computers and printers at stations in the anatomy and physiology classroom to provided hands-on monitoring of human physiology for all pre-health students, 2) purchase of several software packages for instruction including software for geographic information systems (ArcGIS), statistics (SAS, SPSS, R), and population genetics, and 3) approximately \$80K has been spent since 2011 on purchases of equipment and models to improve undergraduate instruction

6.d. Description of actions to be taken as a result of this review, including instructional resources and practices, and curricular changes.

From the results of the 2010 CUR review, the Department has restructured its “outdated” curriculum and reduce the core requirements (described in detail in part 6c above) to provide more flexibility for students and allow for a smoother transition from community colleges. In 2015, the department piloted a cross-curriculum project focused on the theme of climate change (described in 6.b.5 above).

8. Outcome

8.1 Decision:

Program in Good Standing

Program flagged for Priority Review

Program Enrollment Suspended

8.2 Explanation

On behalf of the office Academic Affairs, I appreciate the continued commitment of the faculty and program as they continue to innovate and plan for future, particularly in light of faculty attrition and enrollment challenges. The responsiveness to assessment outcomes is commendable. Finally, the report demonstrates the faculty's commitment to academic excellence and student success.

Dean's Comments

The B.S. in Biological Sciences is one of the largest majors at EIU, and most of the students in the pre-health fields are housed in the department. Strategic hiring and curricular changes have positioned the department well for the future, in spite of several recent retirements and overall faculty attrition. The department has provided enhanced opportunities for majors through participation in interdisciplinary programs, particularly in the areas of sustainable energy and geographic information sciences (GIS). Given the large number of students in the health fields, a Health Advisor position is slated to be filled once funding becomes available. This will add additional recruitment focus for the program. Seeking the means for a thorough renovation of the aging Life Sciences building and strategic hiring of Biology faculty, as well as a Health Advisor, are priorities for the College of Liberal Arts and Sciences as Eastern Illinois University works to recover from the recent budget impasse.