Biology Response to 2018 Program Review

The Biology faculty completed a departmental self-study during the 2018 academic year. The review included the production of a self-study document as well as a site visit by Dr. P. Boily in May 2018. Dr. Boily submitted a report which was then discussed by the entire Department of Biology and Chemistry. As a result, the following action plan for the next 5 - 7 years has been developed. It should be noted that the evaluation format followed AUC16, approved in the 2015 Academic Year. The format of the action plan therefore reflects the structure as outlined in those guidelines. A new program review process was approved in AY18; however, this proposal was not available within the timeline under which the program review was completed and represents a change in focus, evidence, and format. Additionally, no training or guidance has yet been supplied for the implementation of the new guidelines. Therefore, the decision was made to adhere to the guidelines effective during the self-study process but include where possible elements of the new guidelines in the action plan.

The overall conclusion of the outside reviewer was the following, "*The department appears to have taken this process seriously, as most of the recommendations from the previous review were implemented. There is nothing in the self-study that I disagree with. Specifically, the section Plan for Change seems realistic and desirable.* " In addition, the reviewer made a series of additional suggestions or comments based on the visit, the self-study document, and information from the university website. Since the review concluded that the plans for change as outlined by the department were appropriate, they were incorporated into the action plan. In addition, several, but not all, of the reviewer's suggestions were incorporated as action items. A third category of action items was developed in response to suggestions that didn't appear to extend from our document but would be expected under the new self-study guidelines. For example, the reviewer mentioned that course delivery methods were not discussed. For these areas we had not collected data so it would be hard to develop action items under those conditions. However, with a nod towards the next self-study, we propose several action items that will allow committees within the department to begin data collection and consideration of these areas.

Several of the suggestions that the reviewer made could be considered to be managerial in nature. While we appreciate these suggestions, it should be noted that many of them have already been tried over the last 15 years. Generally, however, they had to be abandoned because they dramatically reduced the quality of the educational experience for our students. In fact, several of the suggestions, use of large class sizes and adjuncts in entry level courses contradict evidence based best practices in STEM. Many studies have demonstrated that smaller class sizes result in more engaging instruction[1], better student participation[2,3], a sense of belonging[4], and therefore much higher student success and retention[5,6]. The current chair, Dr. Mel Govindan, is experienced, thoughtful, and capable in his management of our curriculum. He has been a committed advocate for all students but especially our diverse students and recognizes the importance of maintaining STEM best practices in order to support their success. As a result, we will continue to support Dr. Govindan in his managerial role

guided by STEM best practices and will take under advisement the suggestions made by the reviewer but will not add them to our action plan.

The department especially disagrees with the recommendations to increase class size in introductory courses and to hire more adjuncts to teach lab sections. These two suggestions contradict Fitchburg State's recent focus to increase student success, especially among minority students. Furthermore, larger classes and more adjuncts in labs would damage Fitchburg State's "brand" of offering an affordable education with individual attention. Currently, we try to have the same lecture instructor teach most, if not all, lab sections in a course. Student surveys have repeatedly supported this approach, and the strongest selling point we hear during Open Houses is when our majors tell prospective students that they will have the same professor teach lecture and labs "so professors really get to know you." Having the same instructor also improves pedagogy by integrating lecture and lab topics well. In contrast, when we have needed to use adjuncts to cover lab sections, students often complain that they feel disconnected in a lab section taught by a different instructor. Finally, our growing number of students with disabilities and challenges need faculty that are frequently available for help, which is not possible from adjunct instructors.

The reviewer also made a series of suggestions that the department either found puzzling or reflect an unfamiliarity with our state system. For example, we have had a reliable rotation of elective/capstone courses since the last NEASC review. It is posted on our website and was included as Appendix J. In fact, we found it surprising that the reviewer seemed unaware of this appendix but was familiar with our MSCA contract. Next, science education is a balance between the acquisition of knowledge and skills and having students learn how to apply their knowledge and skills. As such, we maintain that laboratory courses are an important component of our curriculum. However, we have been attempting to add additional non-lab courses where appropriate so we were surprised that this suggestion was made. Perhaps, as with the course rotation, we failed to clarify in our self-study that these two processes were ongoing and part of our approach to managing our curriculum. Finally, our work with MWCC over the last four years was not included because a discussion of outreach activities was not called for in AUC16. We have an established relationship with their dean and faculty and have had multiple exchanges over the review period working to solve and enhance the experience of transfer students. Moreover, the state has implemented a revised Mass Transfer Agreement that addresses the very issue raised by the reviewer as this is an issue that impacted all transfer students across the state. Dr. Govindan and Dr. Meg Hoey (then Interim Dean of Health and Natural Sciences) along with other faculty members from the department played key roles in the development of the new Mass Transfer Pathways and a new set of STEM A2B Pathways for community college transfer students.

1. Arias, J. J., & Walker, D. M. (2004). Additional evidence on the relationship between class size and student performance. *The Journal of Economic Education*, *35*(4), 311-329.

2. Cuseo, J. (2007). The empirical case against large class size: Adverse effects on the teaching, learning, and retention of first-year students. *The Journal of Faculty Development*, *21*(1), 5-21.

3. Kalinowski, S., & Taper, M. L. (2007). The effect of seat location on exam grades and student perceptions in an introductory biology class. Journal of College Science Teaching, 36, 54-57.

4. Nagda, B., Gregerman, S., et al. (1998) "Undergraduate student-faculty research partnerships affect student retention." *The Review of Higher Education* 22.1 (1998): 55-72.

5. Graham, M. J., Frederick, J., Byars-Winston, A., Hunter, A. B., & Handelsman, J. (2013). Increasing persistence of college students in STEM. *Science*, *341*(6153), 1455-1456.

6. Kokkelenberg, E. C., Dillon, M., & Christy, S. M. (2008). The effects of class size on student grades at a public university. *Economics of Education Review*, *27*(2), 221-233.

Action Plan Biology Program

Action Items	Responsible committee	Timeline for implementation	Resources Needed/Notes
Clarifying expectations and assessment in capstone courses.	Curriculum and Assessment	AY21	Assessment Committee along with ad-hoc members of capstone courses will generate a draft of expectations and assessments by the end of AY20. The curriculum committee will then review the recommendations and both committees will then bring to entire department for discussion and approval.
Clarify the objectives and outcomes of Independent Studies.	Curriculum	AY19	None needed.
Reassess the need for additional courses offered at 2000 or above.	Department Chair in association with Curriculum Committee	AY23	Additional courses have already been added to the curriculum. The department will reassess the need for additional courses by the date specified.
Consider a physiology cluster requirement for majors.	Assessment	AY20	Revisit and update course mapping of curriculum in order to determine if cluster requirements are a viable or necessary addition to the program.
Considering making statistics a requirement.	Department Finished	AY19	The diverse needs of our students make the implementation of this requirement problematic. Since Applied Statistics has been a recommended course for many years it was felt that the students are best served by advisor recommendation rather than making it a requirement.
Continue to address challenges in our assessment plans.	Assessment	Ongoing	The committee will develop an action plan to address specific deficiencies within the assessment plan. This plan should include timeline and required resources. Resources may include funding for summer working groups.
Improve the coordination and marketing of internships with the addition of an internship coordinator.	Department Chair	Ongoing beginning AY20.	Coordinate with the dean. Possibility of summer stipend in addition to course release.

Addition of release time for the health professions advising.	Department Chair	AY19	Coordinate with the dean.
Document active-learning and guided inquiry in courses.	Curriculum	Ongoing	The department will develop a system of documenting the use of different course delivery mechanisms and STEM best practices
Continue to participate in campus-wide initiatives to retain diverse students.	Student Affairs	Ongoing	Utilization of SSC, embedded tutors, additional faculty training, participation on campus-wide committees aimed towards student success.
Develop a consistent rotation of graduate courses.	Graduate Committee	AY23	The long delay has to do with recognition that many programs are being revamped. Once GCE has stabilized then a course rotation will be developed that meets the needs of students in the new programs.
Search for a full-time, tenure-track faculty member to teach A&P with a specialty in vertebrate biology.	Search Committee	AY20	
Develop an equipment maintenance and replacement plan.	Equipment and Facilities	AY20	The equipment and supply budget may have to increase depending on the equipment needed. Plan developed AY2019. Implementation begins in AY2020. This action item needs to include technical staff.
Review the new self-study guidelines AUC 176 from AY12018 and reconfigure the department committee structure and work distribution.	Department-wide	AY19	
Analyze the ever-increasing burden on the department of for non-major's courses and summer programs.	Chair in association with an ad-hoc committee	AY21	