Biology Department Self Study – 2009-2015

Departmental Resource Analysis

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This document provides an analysis and brief description of the metrics requested by the Faculty Salary and Budget Committee. Two additional metrics are included to provide alternate views of departmental efficiencies. Each metric requested by FSBC is numbered and described as follows:

1. # of majors – undergraduate and graduate
2. # of minors
3. # of degrees awarded – undergraduate, graduate, and minors
4. Student Credit Hours (SCH) generated
5. # FTE Tenure Track (TT) faculty
6. # FTE full-time faculty (adds affiliates and visitors to TT)
7. % of SCH taught by Tenure Track (TT) faculty
8. % of SCH taught by Full-Time faculty
9. % of lower division SCH taught by Tenure Track (TT) faculty
10. Average teaching/workload (comparisons with University and College mean)
11. Average class size: Lower division, upper division and graduate
12. Cost per credit hour

The resource analysis of the Biology Department shows consistent, sustainable patterns over time. The Biology Department has been very efficient in its instructional delivery during the study period, maintaining high-quality programs with increasing numbers of majors, while doing so with only minimal increases in annual base budget allocations to cover course-related expenses, and without a net increase in regular tenure-track faculty.

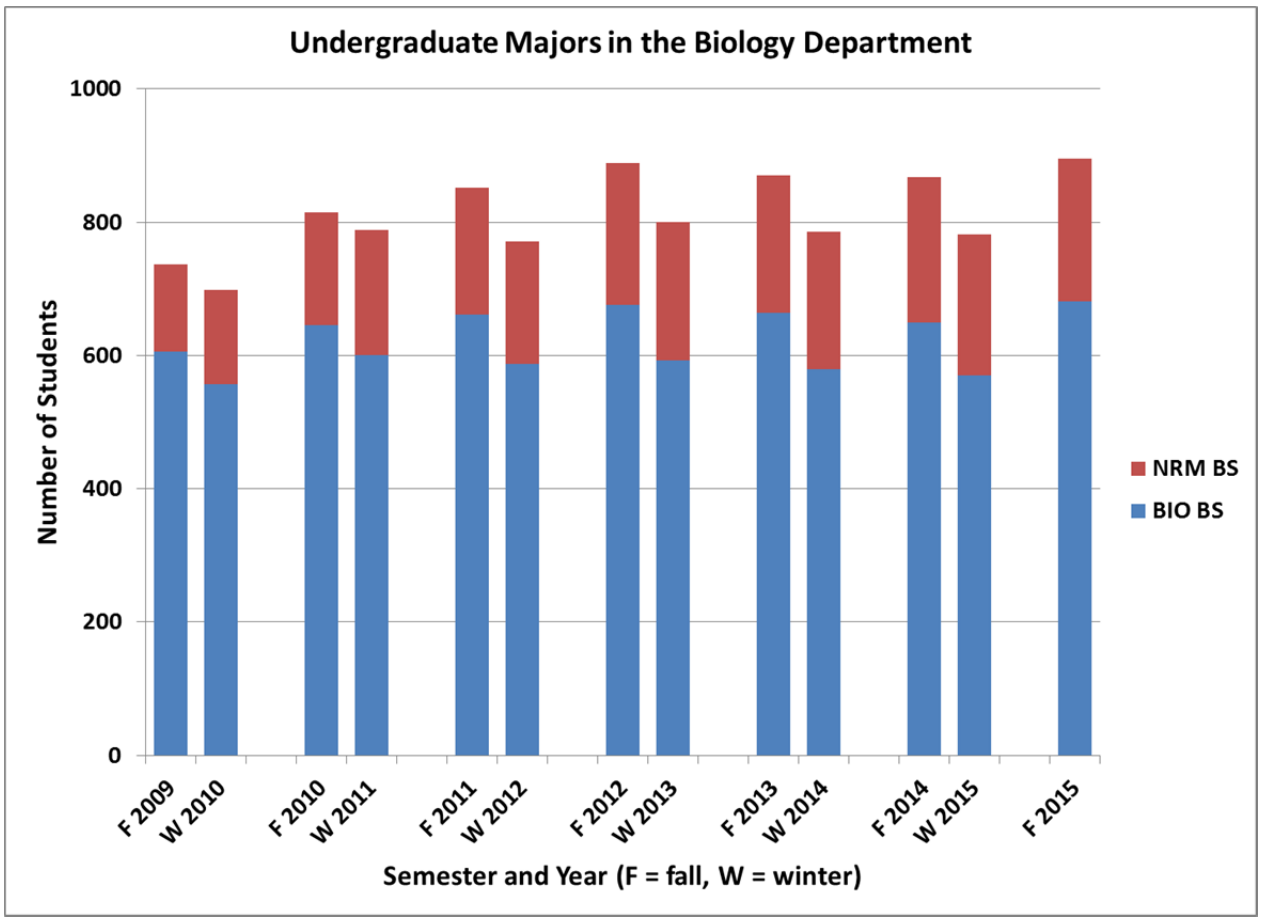

Figure 1 (Metric #1a). Numbers of undergraduate majors in the Biology Department by academic program, 2009-2015.

The Biology Department has experienced a steady increase in its total number of majors during the study period, most noticeably from fall, 2009 through fall, 2012 (Figure 1). The number of Biology majors increased from 605 in fall, 2009 to 681 in fall, 2015, although the total number of Biology majors has remained fairly steady since fall, 2012. Similarly, the number of NRM majors increased from 131 in fall, 2009 to 214 in fall, 2015, with the number of NRM majors also remaining fairly steady since fall, 2012. With over 800 undergraduate majors, Biology remains one of the largest departments in CLAS. Even the smaller of its undergraduate programs, Natural Resources Management (NRM), is larger than several other CLAS science departments. Stable enrollments of majors from 2012 onward have allowed the Department to focus on maintaining and improving the quality of these programs, both of which continue to attract good numbers of students. Decreases in the number of majors from fall to winter largely represent the effect of students graduating in December, along with the incidental attrition of majors normally experienced in many academic programs during an academic year.

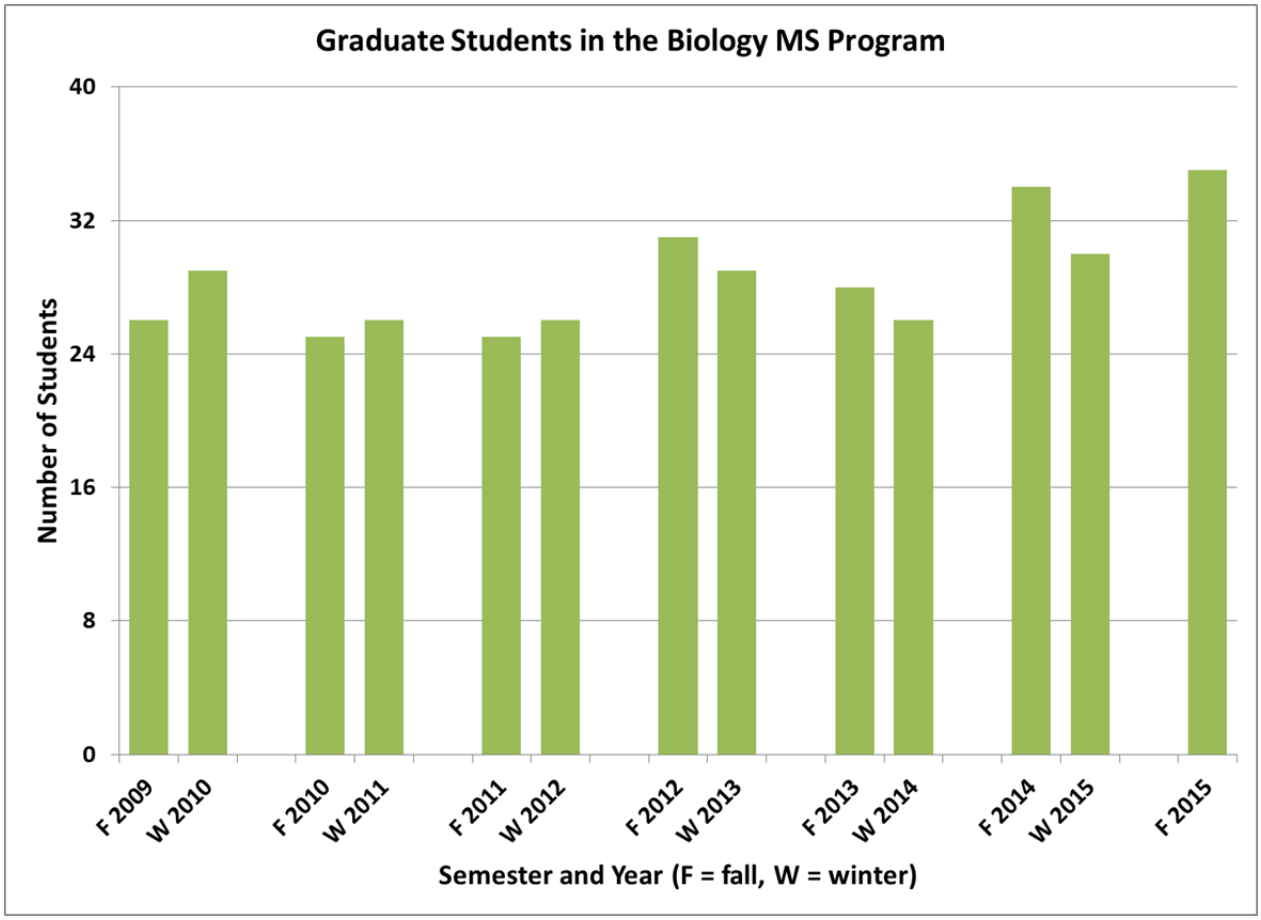

Figure 2 (Metric #1b). Numbers of graduate students in the Biology MS program, 2009-2015.

The number of graduate students enrolled in the Biology MS program has steadily increased during the study period, from 26 in fall, 2009 to 35 in fall, 2015 (Figure 2). When the Biology MS program was originally proposed and approved by the university, we had projected a total annual enrollment of at least 24 students, so the program has consistently exceeded that target population during the period of this study. While we would like to see graduate enrollments continue to increase, there are constraints on graduate program size dictated by resource limitations including the number of regular tenure-track faculty in the department able to advise graduate students, the number of departmental assistantships available, the amount of external funding that faculty can realistically obtain on a consistent basis, and competition for students with other graduate programs in the region. The department's new strategic plan includes goals for continuing to increase the quality of the graduate program while also increasing the resources available to our graduate students, both of which are vital to maintaining a graduate program that will remain competitive in the state, region, and nation.

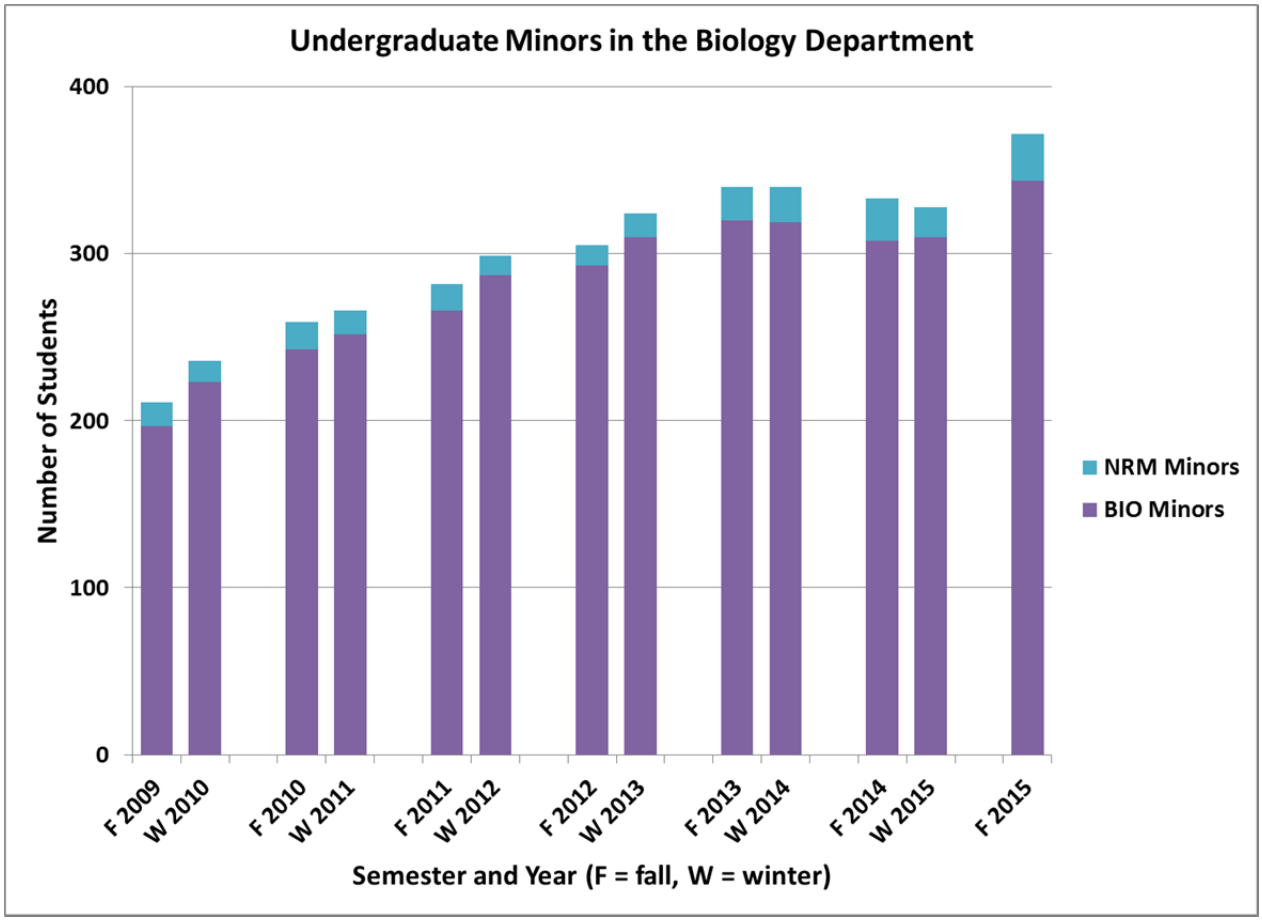

Figure 3 (Metric #2). Numbers of undergraduate minors in the Biology Department by academic program, 2009-2015.

The number of students enrolled in minor programs offered through the Biology Department increased steadily during the study period, from a total of just over 200 in fall, 2009 to over 370 in fall, 2015 (Figure 3). The Biology minor comprises the majority of these students, and attracts students from a variety of other majors including Allied Health Sciences, Anthropology, Biomedical Sciences, Chemistry, Cell and Molecular Biology, Exercise Science, Medical Laboratory Science, Natural Resources Management, Nursing, Psychology, and Statistics. The requirements of many of these majors include one or more biology courses, so there is a natural synergism between the BIO minor and these majors. Fewer students elect the NRM major, largely because it is less synergistic with the requirements of other majors, but the number of students in the NRM minor has doubled from fall, 2009 to fall, 2015. Students enrolled in the NRM minor are drawn from majors such as Biology, Criminal Justice, Geography, and Geology, all of which have natural affinities with the professional focus of the NRM minor.

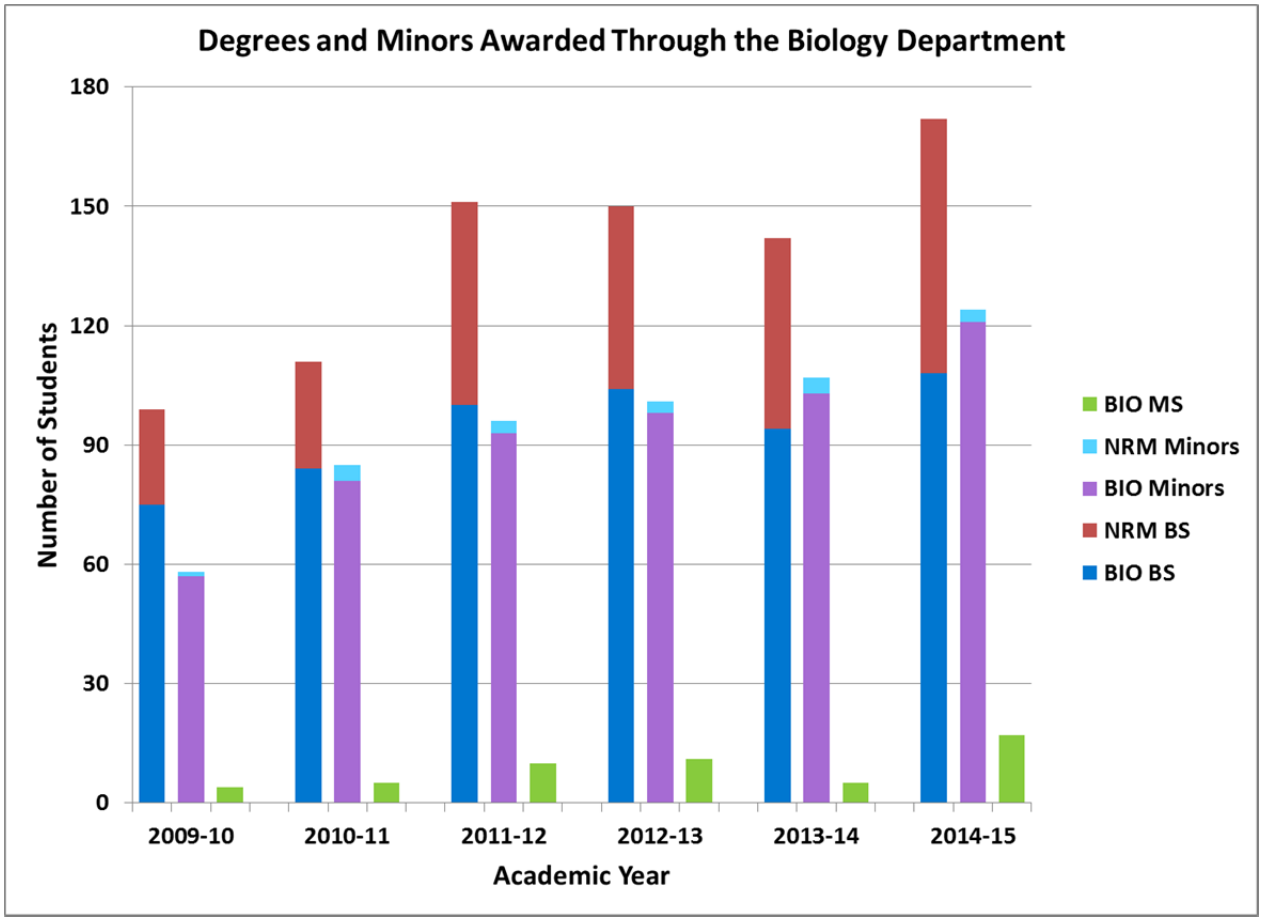

Figure 4 (Metric #3). Numbers of degrees awarded through the Biology Department by academic program, 2009-2015.

The number of undergraduate degrees, undergraduate minors, and graduate degrees awarded through the Biology Department has increased during the study period, most dramatically in terms of undergraduate minors awarded in Biology and undergraduate degrees awarded in Natural Resources Management (Figure 4). The NRM program graduates around a quarter of its 200+ majors a year, while Biology graduates about one sixth of its 600+ majors a year. This may represent differences in time to graduation, but also may represent differences in rates of student transfer in or out of these programs through time. About one third of students electing the Biology minor are awarded the minor on an annual basis, while a much smaller fraction of students enrolled in the Natural Resources minor complete its requirements each year. The number of degrees awarded through the Biology graduate program has generally increased through time, although there is a fair amount of variability from year to year as different student cohorts progress through the graduate program.

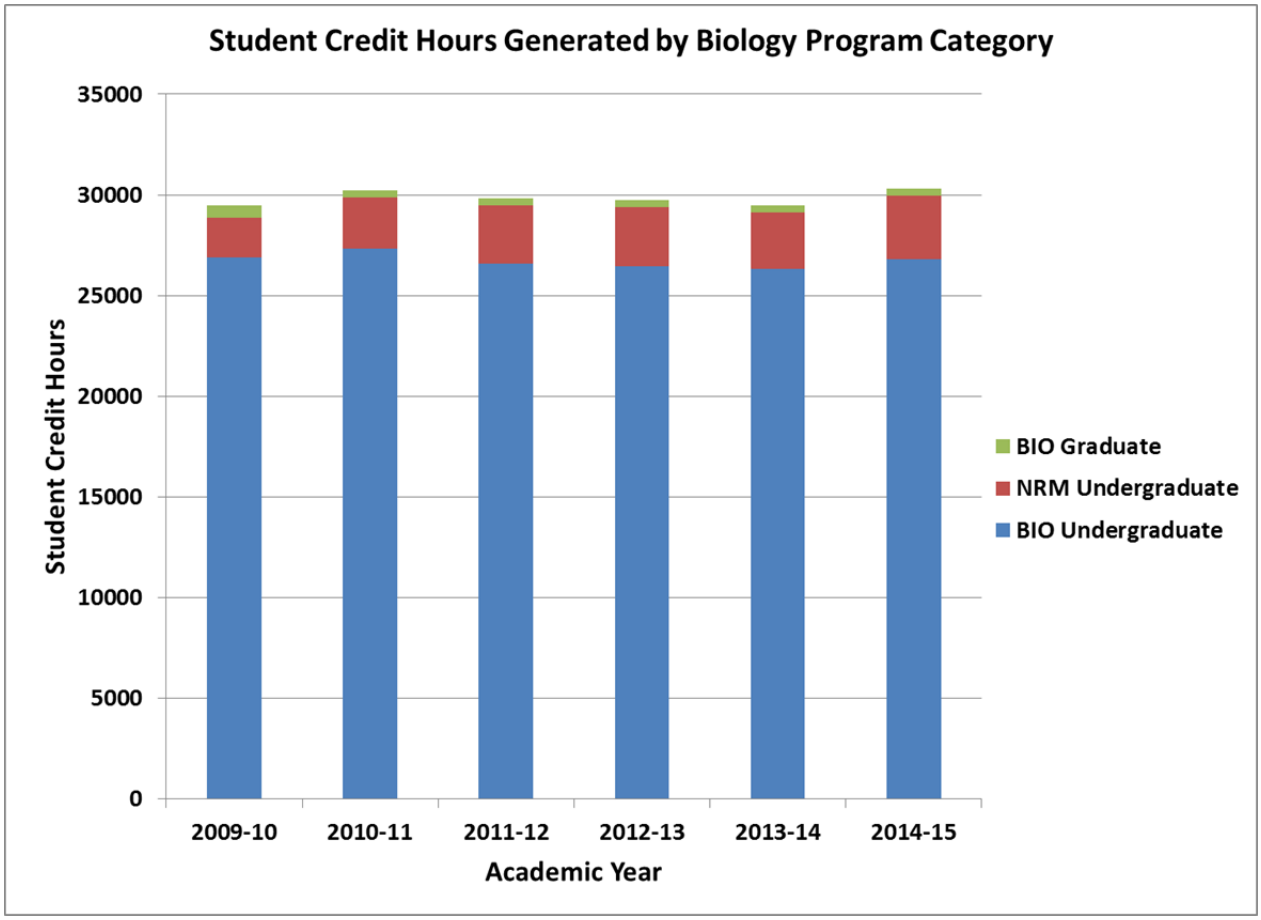

Figure 5 (Metric #4). Student credit hours generated by the Biology Department by academic program, 2009-2015.

The total number of student credit hours generated through the Biology Department has remained relatively constant (Figure 5). Student credit hours generated by the Biology Graduate program and Natural Resources undergraduate program largely reflect the number of credits taken by majors enrolled in these programs, while the student credit hours generated through the Biology undergraduate courses include credits taken by Biology majors, Biology minors, and the large number of students enrolled in Biology general education, service, and issues courses. While total credits generated through Biology undergraduate courses has varied between 26,000 and 27,000 each year, the credits generated through the NRM program have increased from 1941 in 2009-2010 to 3152 in 2014-2015, directly reflecting the increased number of majors in the NRM program. While the number of Biology majors and minors also have increased during the study period, the total student credit hours generated through Biology undergraduate courses has not shown a substantial increase, an interesting trend in that we also have been steadily increasing the number of BIO 120 sections to serve other majors and the General Education program.

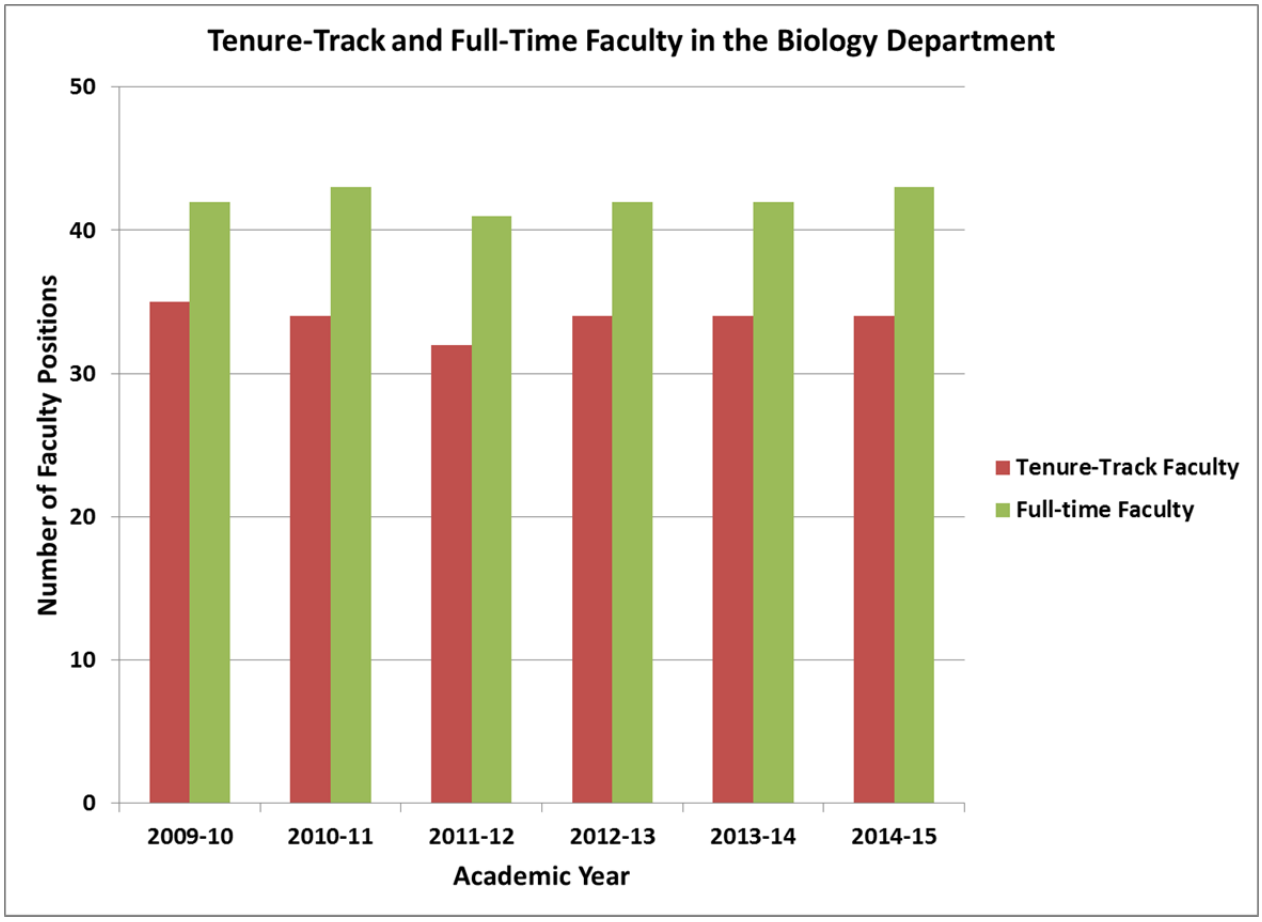

Figure 6 (Metrics #5 & #6). Numbers of tenure-track and full-time faculty in the Biology Department, 2009-2015.

The number of tenure-track and total full-time faculty has stayed relatively constant during the study period, with a net decrease of one tenure-track faculty member from 2009-20015, and a net increase of one full-time faculty member during the same time period (Figure 6). We experienced a gradual attrition of tenure-track faculty from 2009-2010 to 2011-2012 as a result of resignation or retirement, but have not been granted any tenure-track searches since 2011-2012. As a result, the number of tenure-track lines has remained at 34 since 2012-2013. We have maintained the number of full-time faculty teaching our courses by actively requesting visitor lines, and actively pursuing conversion of visitor to affiliate lines when opportunities presented themselves. In winter, 2016, we lost another tenure-track faculty member through reassignment to administrative duties in the Graduate School, so the Biology Department plans to request additional tenure-track lines to replace those we have lost, and to maintain and augment tenure-track presence in our undergraduate courses.

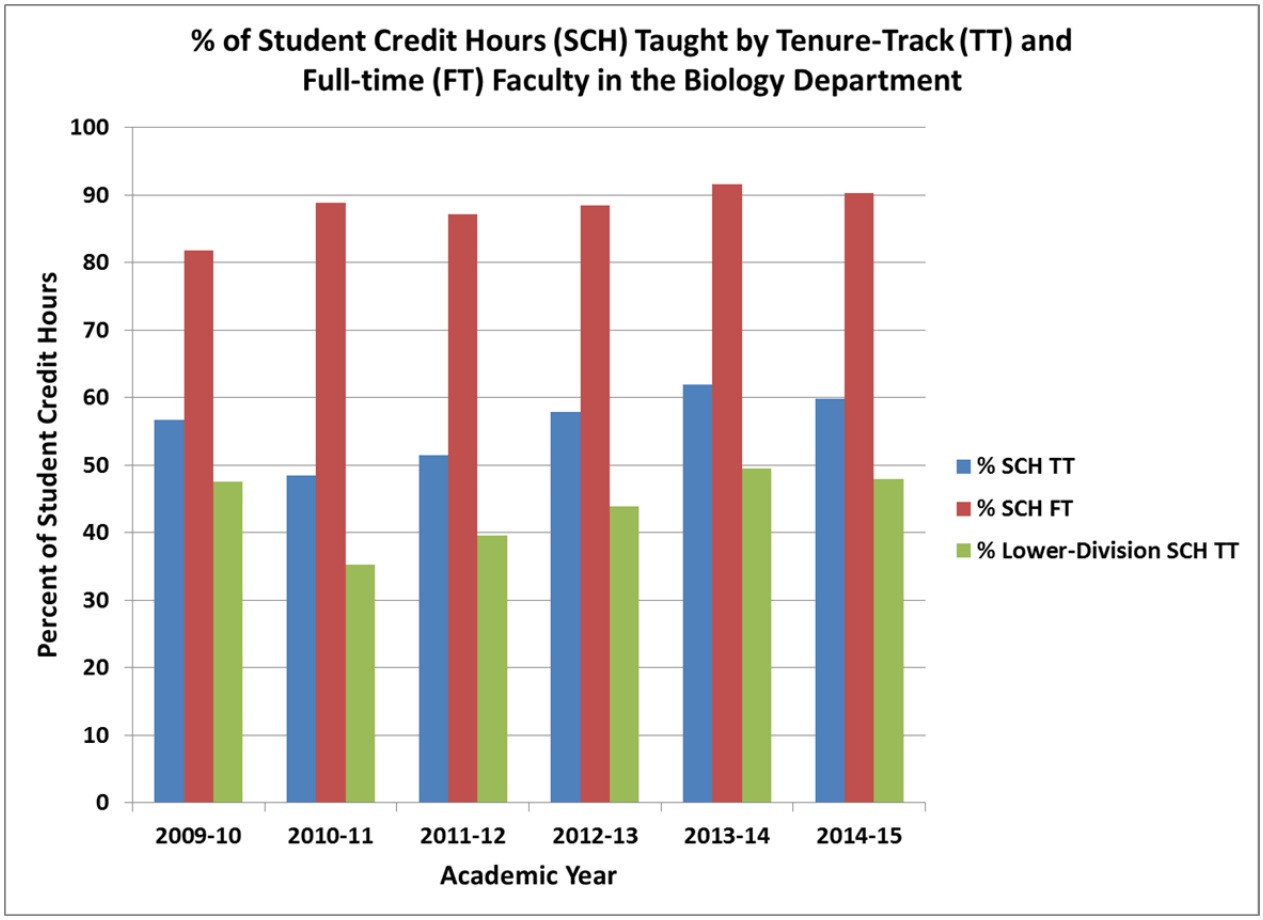

Figure 7 (Metrics #7, #8, & #9). Percent of student credit hours taught by tenure-track and full-time faculty in the Biology Department, 2009-2015.

The percent of student credit hours taught by full-time faculty (tenure track, affiliate, and visitor) increased from 81.7% in 2009-2010 to 90.2% in 2014-2015 (Figure 7). This trend is remarkable in the context of the stationary number of full-time faculty (Figure 6) in the department during the same time period. During the study period, the percent of student credit hours taught by tenure-track faculty has steadily risen to a value of around 60%. The trend in student credit hours instructed by tenure-track faculty closely tracks the percent of lower-division student credit hours being taught by tenure-track faculty, demonstrating the importance of having tenure track faculty involved in our lower-division courses. As a result of commitments on the part of tenure-track faculty, and increases in the size of most lower-division lecture sections, we have successfully increased tenure-track contributions to instruction. The percent of total instruction by affiliates and visitors has varied from 25 to 40% during the study period, averaging around 30% during the last three academic years. The contribution of affiliate and visiting faculty to the overall instruction in the Biology Department is thus extremely important and something that we have intentionally worked to maintain.

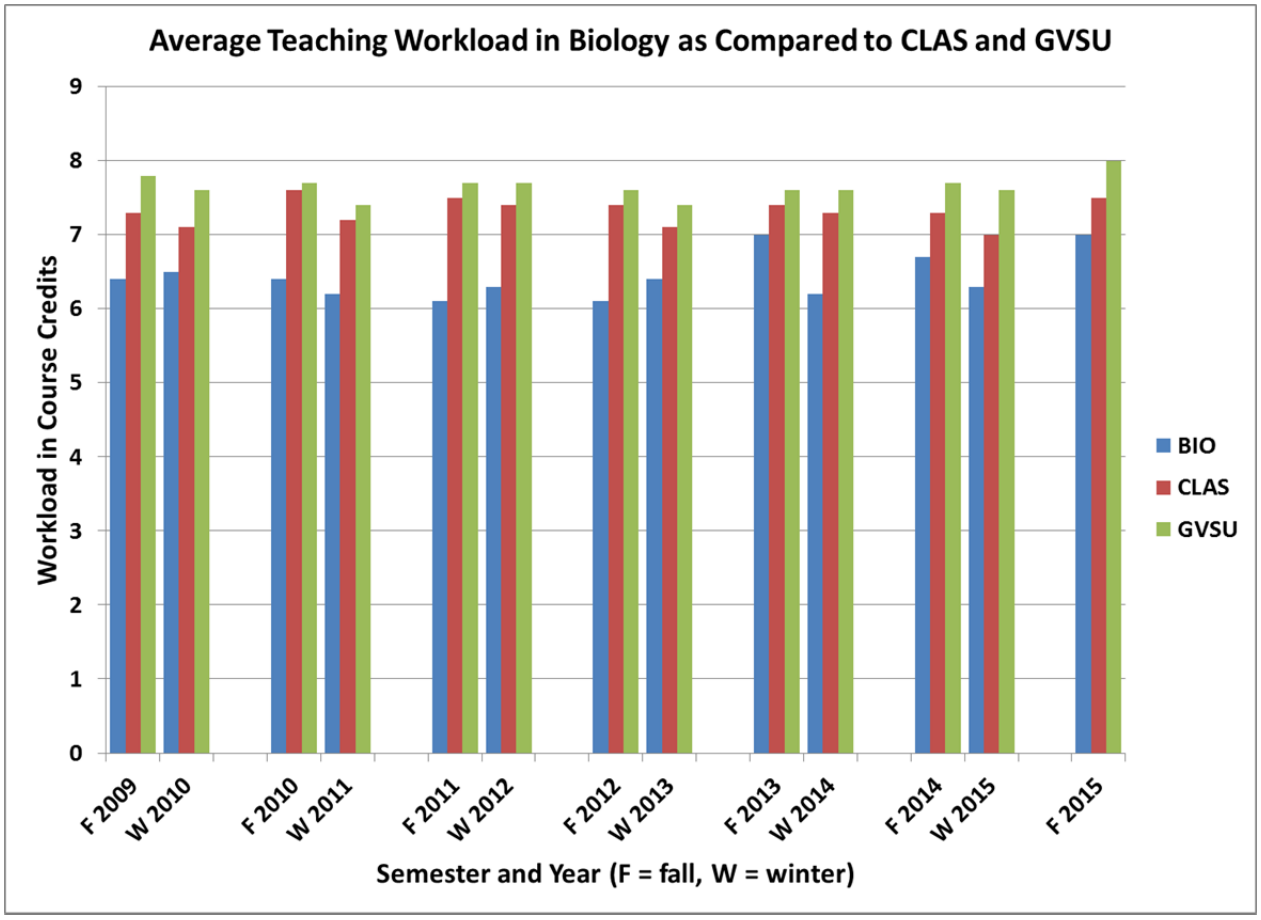

Figure 8 (Metric #10). Average teaching workload in course credits in the Biology Department as compared to CLAS and GVSU averages, 2009-2015.

Average Biology faculty workloads varied between 6 and 6.5 course credits during the first four years of the study period, but recently have tended to increase up to 7 course credits in fall semesters (Figure 8). In comparison to CLAS and GVSU averages, Biology teaching workloads may appear low. This appearance is misleading, however, as Biology teaching workloads have always been calculated in contact hours, not in terms of course credits, with a target of 9 contact hours per semester for faculty without reassigned time responsibilities. Biology, like other science departments, offers many laboratory-based courses in which labs often do not carry course credits separate from the lecture itself, but represent from 2 to 4 contact hours in addition to the 2 to 3 contact hours in the lecture. As a result, when workloads are calculated using course credits, science programs may seem low compared to programs where most instruction is in lectures or discussions. Biology faculty also have assumed substantial service obligations during the study period, including assigned time for course coordinators of large general education courses, BIO and NRM undergraduate and BIO graduate program coordinators, associate chair, unit head, Chair of FSBC, and Director of General Education.

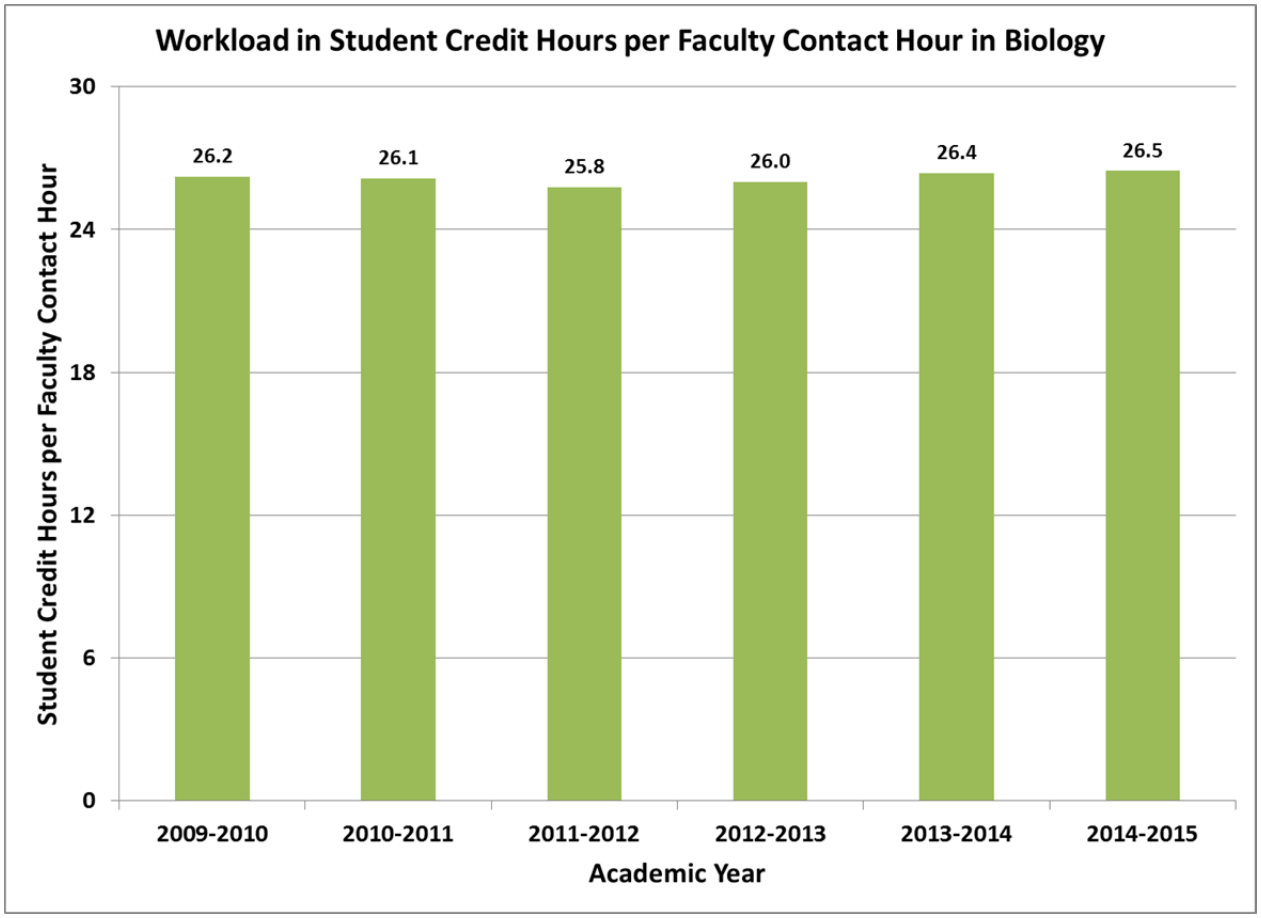

Figure 9 (Added Metric). Average Biology faculty workloads expressed in student credit hours per faculty contact hour, 2009-2015.

When workloads are calculated on the basis of the ratio of student credit hours (SCH) to faculty contact hours (FCH) assigned to teaching, the Biology Department has maintained values between 25.8 to 26.5 (Figure 9). The increasing ratios from 2011-2012 to 2014-2015 represent an intentional effort to increase teaching efficiencies by increasing the size of lecture sections in most 100-level BIO and NRM courses, and targeting a minimum of 24 seats in upper-level elective lecture sections. SCH/FCH values represent the average effective class size in the Biology Department, including student credit hours generated through BIO/NRM 399, 490, 499, and 699 experiences that do not receive faculty contact time. In 2014-2015, Biology faculty generated an average of 26.5 SCH for each FCH assigned to teaching. This is directly equivalent to the workload associated with teaching a 3-credit lecture or discussion course with 26.5 students and 3 faculty contact hours of teaching. These values demonstrate that the Biology faculty has maintained and improved its teaching efficiency even in the face of increasing numbers of majors and minors, increasing demand for introductory courses like BIO 120 and NRM 150, and static numbers of tenure-track and full-time faculty.

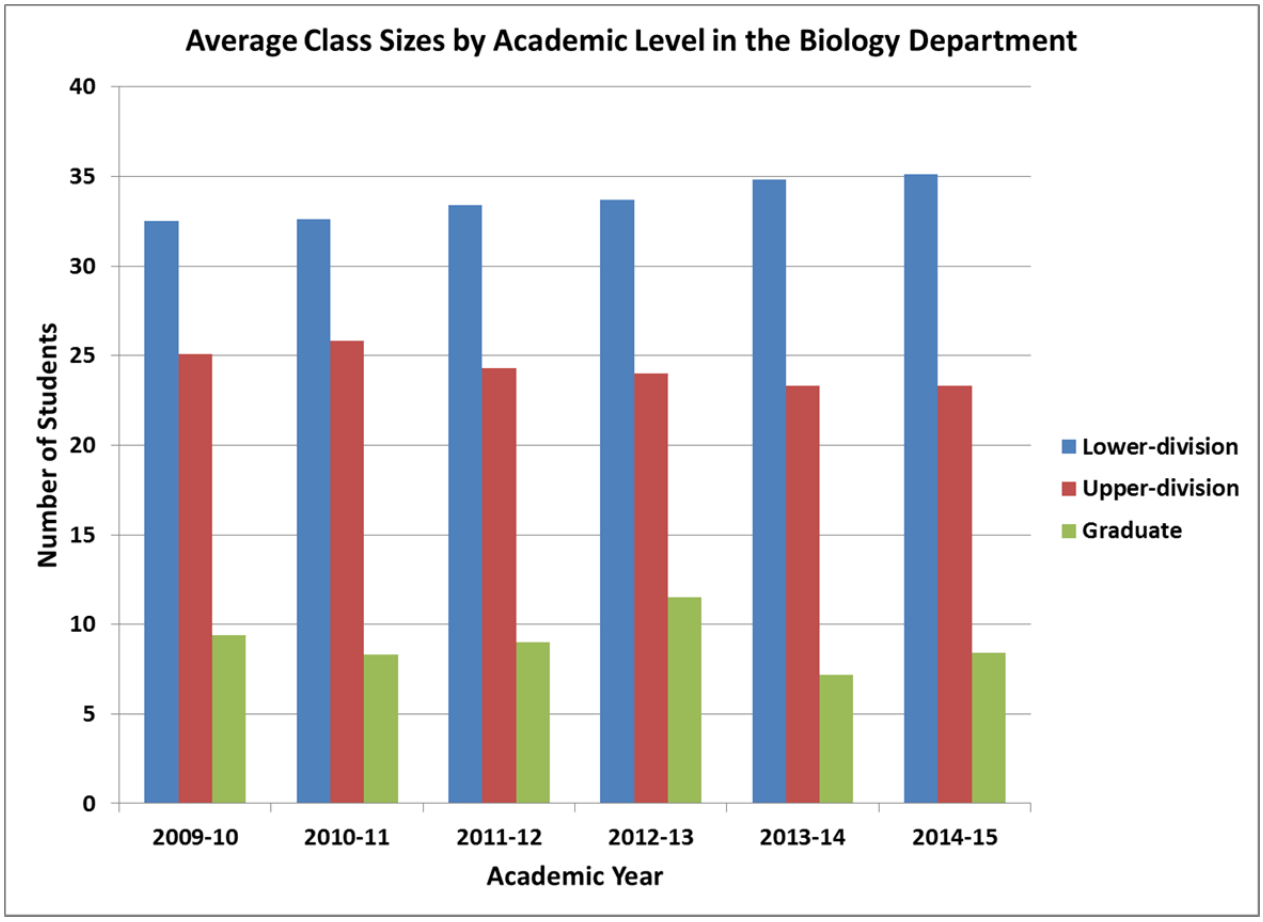

Figure 10 (Metric #11). Average class sizes in the Biology Department by academic level, 2009-2015.

Average class sizes in Biology undergraduate lower-division courses have increased during the study period, while average class sizes in undergraduate upper-division courses have tended to decline slightly (Figure 10). The increase in lower-division class size has been intentional, with the increase from 2012-2013 to 2013-2014 being a direct result of increasing lecture sizes in BIO 104, 105, and 121 from 64-72 to 96. Decline in upper-division class size may represent a variety of trends, including the number of upper-level Biology electives being offered on a routine basis, and a decrease in the number of seats per section in popular Issues courses in response to changing expectations for these courses by the General Education Program. We will be carefully monitoring the trend in upper-division course enrollments in the future. Graduate class size averaged slightly less than 10 during the study period. This is one consequence of having a relatively small graduate program, and the need to offer sufficient graduate-level courses to serve the needs of students with a diversity of interest areas, including aquatic science, terrestrial ecology, and natural resources. The Department is working to assure all graduate courses meet the ten student minimum in the future.

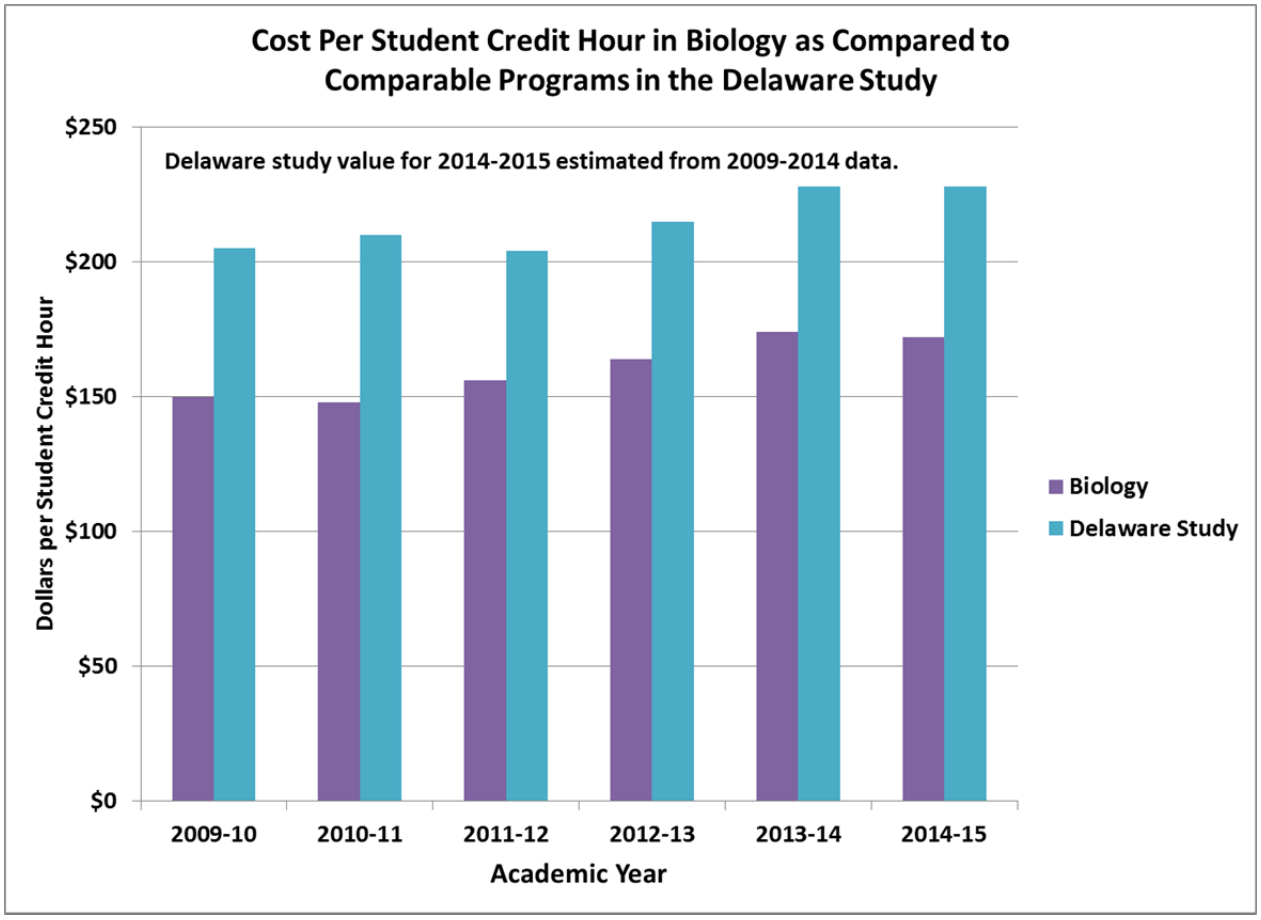

Figure 11 (Metric #12). Cost per student credit hour in the GVSU Biology Department as compared to similar biology programs in the Delaware Study, 2009-2015.

The cost per student credit hour for the Biology Department increased from $150 in 2009-2010 to $172 in 2014-2015 (Figure 11). Cost per student credit hour at GVSU remained substantially below that of comparable general biology programs (undergraduate, 75-100%) included in the Delaware Study, which increased from $205 to approximately $228 per student credit hour during the same time period. This demonstrates the substantial efficiency of the GVSU Biology programs, which deliver high-quality instruction while keeping costs well below the average of comparable programs nationwide. The increase in Biology Department costs during the study period were largely the result of annual increases in faculty and staff salaries and benefits, as total budget allocations to the department related to course expenses increased by only $33499 during the study period (Figure 12). This increase represents only $1.10 per student credit hour from 2009-2010 to 2014-2015, demonstrating that the Biology Department has been very efficient in its instructional delivery, maintaining high-quality programs with increasing numbers of majors, while doing so with only minimal increases in annual base budget allocations and without a net increase in regular tenure-track faculty.

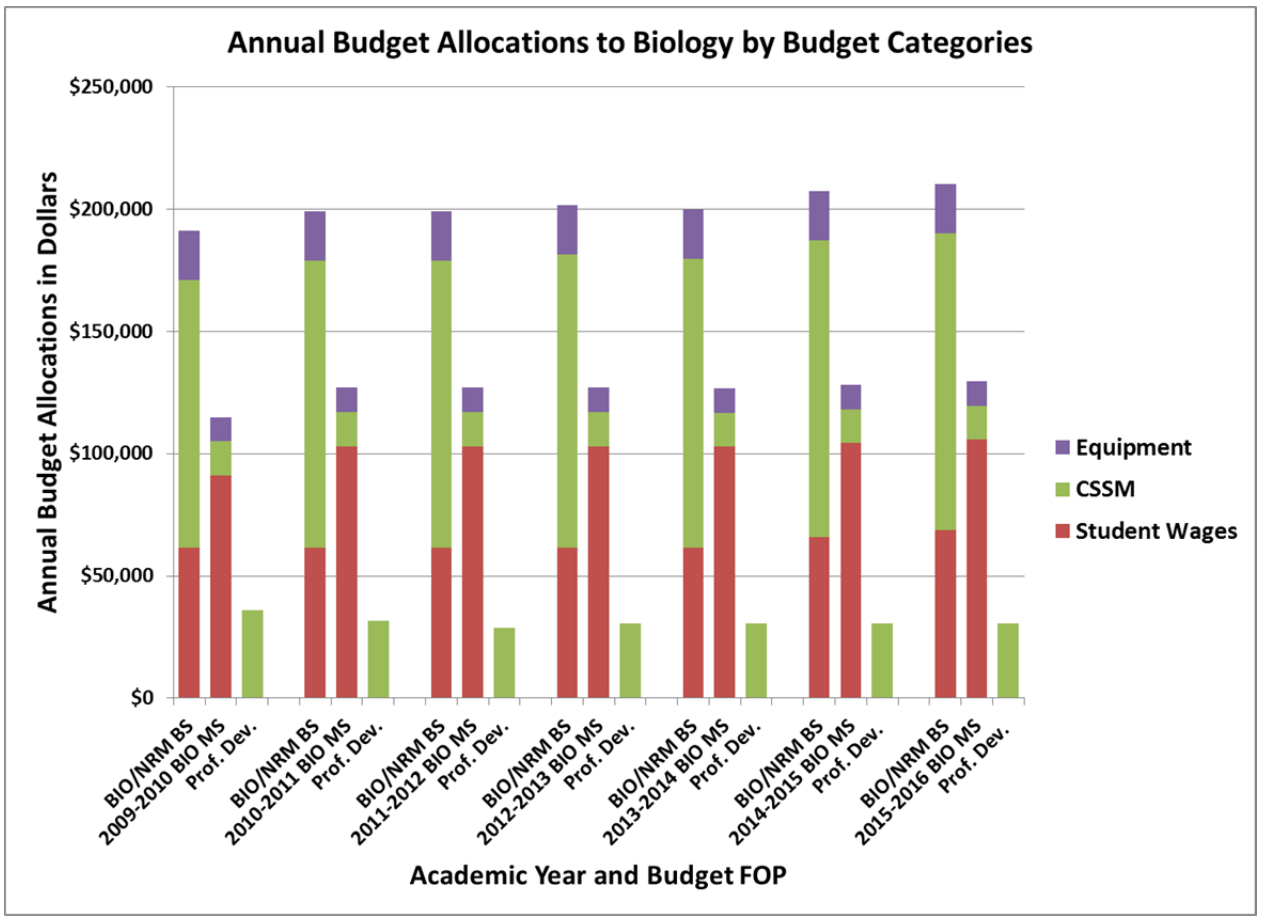

Figure 12 (Added Metric). Annual budget allocations to the Biology Department, 2009-2015.

Annual budget allocations to the Biology Department for undergraduate and graduate programs have increased only slightly during the study period (Figure 12). There have been slight increases in CSSM allocations to the Biology undergraduate programs during this time period, largely to support increases in the number of introductory biology lab courses needed to accommodate increasing enrollments of students in these service courses. Student wage allocations have been increased in both undergraduate and graduate programs, including the addition of one graduate assistantship in 2010-2011, and recent increases in undergraduate student wages to cover increases in the Michigan minimum wage. Student wages directly support students enrolled at GVSU, so these allocations also represent a valuable investment in our own students. Equipment allocations to both the undergraduate and graduate programs have not changed during the study period. Allocations to faculty professional development funds have actually declined slightly during the study period, representing the decline in the number of tenure-track faculty in the department. Overall, the Biology Department has used its funds wisely, and has requested increased annual base budget allocations only when necessary to cover increased course expenses associated with increased course enrollments.