

## **Biology 121 – Fall 2010 – SLOAT Final Report**

### **Introduction**

The purpose of this assessment is to document the progress of a cohort of students taking Biology 121 during the Fall 2010 semester.

Biology 121 (Anatomy & Physiology I) is the first semester of a two semester Anatomy & Physiology sequence, and is a pre-requisite for application to the Nursing, Physical Therapist Assistant, Radiography, Dental Hygiene/Assisting, Respiratory Care and Dietary Manager Programs here at Essex County College (ECC). It is also required for admission to other area Nursing programs, such as those at Rutgers, UMDNJ, and Seton Hall. Along with the subsequent successful completion of Biology 122 (Anatomy & Physiology II), the student is able to fulfill the General Education requirement for a laboratory science sequence, and General Education goal 3 regarding Scientific Knowledge and Reasoning. The Biology 121/122 sequence can also be used to fulfill an elective requirement for the Biology major.

Approximately 21 sections, which each contain 24 students, are offered for this course in both fall and spring semesters. Four additional sections containing 24 students each are offered during the summer, bringing the total number of students enrolled in this course each year to approximately 1100.

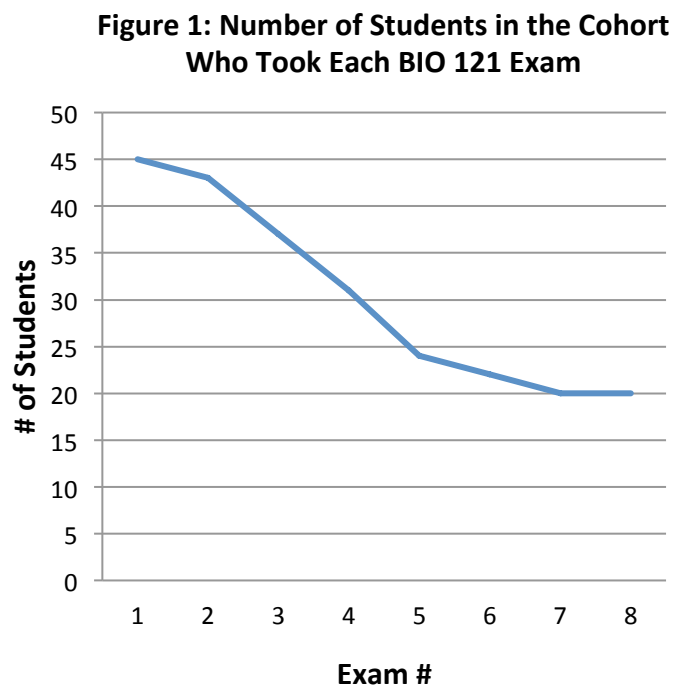
Currently, the only pre-requisites for Biology 121 are completion of all remedial courses, if necessary, or demonstration of college level readiness in Mathematics and English. There is no college science pre-requisite. The course is content heavy, and taught at a rapid pace, a situation unfamiliar to many of our students. This can lead to a high attrition rate, a problem not just at ECC, but at colleges all over the country.<sup>1</sup> Since mastery of this course is crucial for so many students in pursuit of their goal to become a health professional, it was chosen for this pilot assessment project.

### **Methodology**

Fifty students, comprising two sections, were part of the initial cohort. This number was based on the official class lists after the “no shows” were removed. Eight exams were given in class at varying intervals throughout the semester starting with the third week of class. Each exam contained a variety of short answer questions which were blueprinted to specific MPOs. Assessment methods used were D (Direct), S (Summative), QN (Quantitative), and Obj (Objective). Multiple questions were used to assess each MPO. Each question was scored for the number of students selecting the correct answer. This number was converted to a percentage of the total number of students taking the exam. Multiple percentages for each MPO were then averaged to determine the overall student success for each MPO.

## **Results**

As shown in Figure 1 below, the number of students taking the exams declined gradually over the course of the semester, from 45 to 20. Although 50 students were registered, only 45 took the first exam, an immediate loss of 10%. Three of those five did not return to class. The other two returned to take the second exam; one dropped immediately after, and the other attended irregularly until the end of the semester. The steepest declines occurred after exams 3 (histology and integumentary system) and 4 (bone physiology). Exam 5 was given after midterm warnings were sent out, but just before the final drop date. By that time, most of the students had made their decision as to whether or not to remain in the class. Twenty students took both exams 7 and 8, although only 18 of the 20 were the same for both exams.



Student success for each MPO is shown in Table 1 below. Most of the success rates are between 60-70%. Notable exceptions are Exam 2, where percentages are below 60% for all MPOs assessed, and Exam 5, where the score for MPO 2.2 is 57.5%. The material covered for Exam 2 is essentially a “crash course” in biochemistry and cell biology. Exam 5 is a practical exam on bone and joint identification.

**Table 1: Student Success for Each MPO on Exams 1 – 8**

MPO	Exam 1	Exam 2	Exam 3	Exam 4	Exam 5	Exam 6	Exam 7	Exam 8
1.1	68.7							
1.2	61.2							
1.3		56.7						
1.4		49.4						
1.5		55.9						
1.6			62.3					
2.1			62.7					
2.2				73.1	57.5			
2.3						65.6		
2.4							70.1	69.2
3.1	56.4							
3.2			70.8					
3.3				68.2	72.2			
3.4						69.9		
3.5							61.3	72.5

Students were asked to complete brief surveys after Exams 1 and 2. Thirty-nine students completed the survey after Exam 1 (see Appendix A for full results). Several students did not have a book or lab manual, but most felt that the exam was reasonable, and virtually no one felt time pressure. Unfortunately, 16 students felt that they did not study enough due to overcommitted schedules. This fact appeared repeatedly when students listed other factors which contributed to their exam scores. Students also wrote: “stress not related to class; focused more on math class; lack of sleep, nervous; didn’t make it as much of a priority as I should have; careless mistakes with reading questions; and misunderstood two questions. “

Thirty one students completed the survey after Exam 2 (see Appendix B for full results). As noted, successful completion of MPOs was generally lower on this exam. Here again, 10 students cited an overcommitted schedule, with comments including “family troubles/didn’t study,” and “crammed this past weekend and froze at test time.” Several students indicated that they did not feel that they studied the correct information.

### **Discussion**

Biology 121 is the first part of a two semester course in Anatomy & Physiology. As such, the content is both quantitatively and qualitatively difficult to master. In addition, critical thinking and analysis are required to answer some of the questions. Anecdotally and demonstrably, many students are unaccustomed to this type of course, are insufficiently prepared, and lacking in the appropriate

study skills. Thus, while successful completion rates for the MPOs generally hovered between 60-70%, this was not surprising.

Successful completion rates for MPOs 1.3, 1.4, and 1.5 (Exam 2) fell below the 60% rate. These MPOs encompass biochemistry and cell biology, basic information that is crucial for success. Currently, the only pre-requisites required to take Biology 121 are successful completion of developmental math and English/reading if required, or demonstration of college level competency in these areas. Students were surveyed at the beginning of the semester to make sure that these requirements were completed (data not shown). There is no biology and/or chemistry requirement. While the course obviously provides instruction in these areas, it is quite a rapid pace of delivery for such critical information. Biology is not required for high school graduation in New Jersey<sup>2</sup>, and many students begin BIO 121 with the most rudimentary of scientific backgrounds. An in depth, detailed examination of these fundamental topics of biochemistry and cell biology, however, is provided in Biology 100, a preparatory class which may be taken while taking developmental classes, prior to the start of BIO 121. Many students should take advantage of this class, but fail to do so since it is not a requirement.

Successful completion of MPO 2.2 (Exam 5) was 57.5%. The topics covered on this exam included bone and joint anatomy. In this case, the issues are slightly different. First, the exam format is a practical exam, rather than the standard short answer to which the students have become accustomed. Students are asked to identify bones, markings, and articulations from the sample presented on the bench. Most students have never had this type of exam, and many panic at the format change. Second, the quantity of information is very large, although not as complex as the biochemistry/cell biology. Again, many students do not have the time or the skills necessary to adequately learn the material, or sufficiently recognize the time needed to master these skills until too late.

A rigorous background in Anatomy & Physiology is critical for success in the health related professions. Many students are interested in these professions, as they are ones in which well-paying jobs are available without excessive years of education. Problems similar to those noted here have been observed at other institutions. At the University of Southern Indiana, a Supplement course for students identified as high risk, for failing or withdrawing due to many of the same issues presented here, was implemented.<sup>1</sup> Success rates (as measured by a final grade of C or better) improved for those enrolled in the Supplement. A "supplemental course," BIO 100, already exists at ECC. Therefore, a discussion about the pre-requisites for BIO 121 should be held by the Division Curriculum Committee. In addition, consideration should be given to the quantity of material on Exam 5, or possibly breaking it up into two smaller exams.

1. Hopper, M. 2011. Student Enrollment in a Supplement Course for Anatomy and Physiology Results in Improved Retention and Success. *Journal of College Science Teaching* 40 (3): 70-79.
2. Brody, Leslie. "N.J. Puts Off Plans for High School Biology Test." *Bergen Record Online* 28 Dec. 2010. Web. 31 Jan 2011.

## Appendix A – Student Survey Administered After Exam 1 in BIO 121

---

**N=39**

SCORE EARNED ON EXAM #1 \_\_\_\_\_

### PLEASE ANSWER THE FOLLOWING QUESTIONS HONESTLY:

1. How prepared were you for this exam based on the work you've done so far? (Circle one.)

FULLY PREPARED **12**    SOMEWHAT PREPARED **23**    NOT AT ALL PREPARED **3**

2. Do you have a copy of the required textbook (or a similar book by a different author)?

YES **35**                      NO **4**

3. Do you have a copy of the lab manual?

YES **33**                      NO **6**

4. How much homework have you done so far this term? (Circle one.)

ALL **20**            MOST(>50%) **14**            SOME(<50%) **3**            NONE **2**

5. How did you find the level of the exam? (Circle one.)

TOO HARD **5**                      REASONABLE **32**                      TOO EASY **1**

6. Did you feel rushed to complete the exam? (Circle one.)

YES **1**                      NO **37**

7. If you didn't do as well as you'd hoped, why not? (Circle all that apply.)

TEST ANXIETY **13**                      INSUFFICIENT BIOLOGY BACKGROUND **7**

DIDN'T STUDY ENOUGH – LAZY **1**    DIDN'T STUDY ENOUGH – OVERCOMMITTED SCHEDULE **16**

OTHER: see written report \_\_\_\_\_

**ADDITIONAL HELPFUL COMMENTS CAN BE WRITTEN ON THE BACK OF THIS SHEET.**

## Appendix B – Student Survey Administered After Exam 2 in BIO 121

---

**N=31**

SCORE EARNED ON EXAM #2: \_\_\_\_\_

**PLEASE ANSWER THE FOLLOWING QUESTIONS HONESTLY:**

1. How did you do on this exam compared to Exam #1?

BETTER **2**

ABOUT THE SAME **7**

WORSE **22**

2. If you did **better** on this exam, why was this so? (Circle all that are applicable. Leave it blank if necessary.)

STUDIED MORE

HAVE THE BOOK NOW

COMPLETED MORE HOMEWORK

WASN'T AS NERVOUS – KIND OF KNEW WHAT TO EXPECT **2**

DIDN'T MISS AS MANY CLASSES

OTHER: \_\_\_\_\_

3. If you did **worse** on this exam, why was this so? (Circle all that are applicable. Leave it blank if necessary.)

TEST ANXIETY **7**

BAD BIOLOGY BACKGROUND **7**

MISSED TOO MANY CLASSES

DIDN'T STUDY ENOUGH – LAZY

DIDN'T STUDY ENOUGH – OVERCOMMITTED SCHEDULE **10**

DIDN'T DO ENOUGH HOMEWORK **1**

OTHER: **9 – SEE WRITTEN REPORT**

4. How did you find the level of the exam? (Circle one.)

TOO HARD **9**

REASONABLE **20**

TOO EASY **0**

5. Did you feel rushed to complete the exam? (Circle one.)

YES **3**

NO **27**

**ADDITIONAL HELPFUL COMMENTS CAN BE WRITTEN ON THE BACK OF THIS SHEET ☺**