BIOLOGY PROGRAM ASSESSMENT

B.S. and B.A. Degrees in Biology

These two degrees are considered together because most data is collected without distinguishing between the two programs. The degrees are primarily differentiated by the number of chemistry courses taken, with B.S. students having a significantly deeper exposure to chemistry.

Academic Year: 2009-2010

Form Completed by: Julie Estabrooks, Ph.D.; Science Department Chair

Sources of Evaluative Information:
1. Assessment of the Major Forms completed by instructor of BIOL 490 - Senior Seminar
2. Major Field Test results

Analysis of Information:
The Senior Seminar (BIOL 490) has been taught by the same person since Fall 2007 and the Assessment of Major forms provide a useful source of information because of the consistent perspective and standards of one instructor. The form changed in the middle of the year but the information is comparable. As previously, there is a broad range of competency among the students in this course. There are always a few very strong students and some weak students. The instructor noted that the course grade, prior course performance and MFT scores seemed consistent.

Program Summary comments from the Assessment of the Major Forms indicate the following strengths and weaknesses among our biology students and within the program—

Strengths:
- Diversity of students and majors (chemistry majors took this course in the fall semester; both day and evening students were represented)
- B.S. students are better prepared and stronger performers
- Most students have good computer and presentation skills

Weaknesses:
- Evening students seem especially unprepared for the course.
- Equipment and space for student research projects remain limited
- Many students struggle with committing to a project and completing it in a timely manner.
- Statistical analysis remains a challenge for many students.

MFT scores have become somewhat more useful with the division of day and evening students although it is not clear that we are doing a good job of separating these two populations. Six of the twenty students who took the ‘day’ MFT reported having taken the majority of their science course work in the evening program.
Interpretation is still difficult because some of the content covered in the MFT is not included in coursework taken by B.A. Biology students and the scores for B.A. and B.S. students are aggregated. In addition, because the degrees are designed to be flexible in meeting student needs and goals, students do not always have a background in some of the areas tested by the MFT.

The following table separates performance on the Biology MFT between B.A. and B.S. students. It also separates day and evening students based upon the degree.

<table>
<thead>
<tr>
<th>Table 1. 2009-2010 Biology MFT average scores by degree and program.</th>
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<td><strong>Degree/Program</strong></td>
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<tr>
<td>B.S. Biology</td>
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<tr>
<td>B.A. Biology</td>
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There are no consistent differences between the B.A. and B.S. degree in either total scores or subscores. Since the major difference between the degrees is in the number of chemistry hours taken, this might be expected. Anecdotally, stronger students tend to take the B.S. degree, but there is no clear evidence of this from the MFT scores.

Sample sizes for evening programs were small and it is probably not valid to try to make a comparison between day and evening students.

Assessment indicators reported by ETS provide additional information about areas of strength and weakness. These are reported separately only for day and evening students and it is not possible to separate B.A. and B.S. achievement levels. In every category measured, day program students have higher average scores. Within both the day and evening programs, the lowest scores are found in biochemistry, molecular biology and organismal-plants. The highest scores in both programs are in ‘organismal-animal’.

Average science MFT scores for Columbia College declined from last year to this year, after steadily rising for several years. The decline was across all subscores and most likely represents variation within our student population since neither the degree programs nor the faculty have been significantly altered within the past few years. The decline is of concern, however, and longer term trends should be followed.

Despite the decline in scores, the day program has remained above the 40th percentile in every area in national comparisons. Four of nine assessment indicators are above the 50th percentile.
Evening students scored in the 20\textsuperscript{th} percentile in cell biology and in the 40\textsuperscript{th} percentile or above in other areas. However, the sample size was small and scores were widely varied so conclusions should be drawn with caution. More informative may be the fact that none of the assessment indicators were above 42\% and three were below 27\%.

**Use of this information by the Science Department**
The issues identified by assessment mechanisms are the source of many discussions among science faculty. We continue to investigate ways to strengthen our students’ achievement throughout the science curriculum. A recent focus has been on preparing students in lower-level classes with the skills and information they will be asked to demonstrate and synthesize in upper-level classes. There hasn’t yet been time for recent changes to have a full impact on students who are graduating so it is difficult to assess progress.

Recommendations from previous assessment reports that have been implemented include:

- Basic skills such as applying statistics, using literature and writing formal lab reports have been comprehensively introduced in day lower-level courses so that students are better prepared for upper-level courses.
- All majors are now required to take Cell Biology to reinforce and deepen the cellular biology they are exposed to in their first semester biology class.
- A new one-semester chemistry course for B.A. biology students was implemented in fall 2010. It provides a better background for cell biology, physiology and other coursework.

**Recommendations for improvement**

- Continue to enhance the rigor and consistency of coursework, particularly between the day and evening programs.
- Work more closely with evening faculty to ensure that the basic skills referred to above are being incorporated into courses.
CHEMISTRY PROGRAM ASSESSMENT

B.A. Degree in Chemistry

Academic Year: 2009-2010

Form Completed by: Julie Estabrooks, Ph.D.; Science Department Chair

Sources of Evaluative Information:
1. Assessment of the Major Form/Degree Program Analysis Form completed by instructor of CHEM 490 Senior Seminar
2. Major Field Test results

Analysis of Information:
Twelve students completed CHEM 490 Senior Seminar and took the chemistry MFT test in 2009-2010. Half of these students were dual majors with the forensic science degree.

During the fall semester, the chemistry majors (2) were in the same senior seminar session as the biology majors. In the spring, a separate section was taught for chemistry majors. The Assessment of the Major form was replaced by the Degree Program Analysis form in the middle of the year. All students were able to meet the basic skills and competencies expected in the major although there was a range of abilities.

This is the first year we have had good sample size for MFT and the results should be viewed with some confidence. Average MFT scores were at the 42nd percentile nationally, which was an increase from the 25th percentile last year. Subscores in physical, organic and inorganic chemistry were in the 50th percentile; analytical chemistry was in the 42nd percentile.

Only two assessment indicators were reported for this test; students were strongest (mean of 54% correct) in biochemistry and scored a mean 41% correct in critical thinking and reasoning. Both of these indicators showed strong improvements over the previous year.

Use of this Information by the Science Department:
Data regarding chemistry program outcomes has been limited because of the small number of majors but we are seeing clear trends of improvement that are confirmed by this year’s results. Faculty discussions have centered on new coursework and additional instrumentation, equipment and facilities.

Recommendations from previous assessment reports that have been implemented include:
- Hire a new faculty member in analytical chemistry.
- Develop a new chemistry course for non-majors (CHEM 109) that will allow the existing CHEM 110/CHEM 112 introductory courses to be more focused.
Recommendations for Improvement:

- Integrate primary literature into earlier courses and increase overall exposure.
- Continue teaching CHEM 490 Senior Seminar as a separate section from the biology senior seminar at least once per year.
- Develop a course in instrumental analysis.