

Biochemistry Students' Instrumentation Competence

Biochemistry BS – College of Natural Sciences and Mathematics

Step 1: Student Learning Outcome

Demonstrate literacy in concepts underlying fundamental analytical instrumentation and instrumentation techniques used in chemistry and biochemistry.

Step 2: Methods and Measures

The Department of Chemistry and Biochemistry's Assessment Committee selected items with an emphasis on hypothesis development from the Tobin and Capie, Test of Integrated Process Skills, and adapted items from a study on the ability of analytic scenarios in spectroscopy and chromatography to elicit evidence of critical thinking. The Instrumentation Survey comprised nineteen items, fifteen in multiple-choice format, and four open-end response items that were coded for evidence of eight attributes of critical thinking. Inter-rater reliability between two researchers coding the responses independently was 87.0%.

Data collected via Qualtrics, were downloaded, coded, scored and analyzed for measures of central tendency.

Step 3: Criteria for Success

The criterion for success for Competence in Instrumentation is a percent frequency of at least 65% of scores with a minimum of 65.0 % correct on all of the items.

Step 4: Results

The Instrumentation Survey was administered to Biochemistry and Chemistry students in spring 2021 with a total of 29 valid responses collected. The mean percent of items correct on the Instrumentation Survey was 71%. Scores ranged from 21% to 100% with a median score of 74%.

Open responses were evaluated as containing evidence of critical thinking about spectroscopy or chromatography. If the response manifested 30% of all of the eight possible critical thinking attributes, it was considered correct on the basis of literature reported by McCormack, *et al.*, 2019.

A percent frequency of 76% of the students earned scores of at least 65.0% on the assessment, which exceeded the established criteria for success.

Step 5: Improvement Actions

The Assessment Committee reviewed the results and will make recommendations as they impact the curriculum at a department meeting in spring. The outcome will be reassessed within the next two years to make an effort to increase the response rate and add an observation of the use of instruments to the assessment.