

Chemistry - Biochemistry and Molecular Biology (BS) 2017 - 2018 Assessment Plan

Currently status is: Report Accepted

I. ANNUAL REPORT FOR 2016 - 2017

Mission Statement

The Mission of Department of Chemistry and Biochemistry includes offering a high quality education with state-of-the art training in Chemistry. The department offers three undergraduate degree programs. The B.S. in Chemistry is provided for students who are interested in chemistry graduate school or work in the chemical industry at the bachelors level. The B.S. with a major in Chemistry is for students interested in teaching or in chemistry related fields such as pharmacy or medicine. The new B.S. with a major in Biochemistry and Molecular Biology is for students interested in medical, biochemical, or biological science fields.

Goal 1.

Students are expected to achieve basic mastery of chemical, biological, and biochemical concepts, theories and problems.

Curriculum

BIOL 101 and 102; BIOL 302, 302L; BIOL 303; 3 hrs from BIOL 425, 460, 543, or 620; BIOL 550, 550L; CHEM 111 and 112; CHEM 321, 321L; CHEM 333, 331LCHEM 334, 332L; CHEM 541, 541L; CHEM545; CHEM 555=BIOL 545; CHEM 556=BIOL 546.

Learning Outcome 1.

Students will explain basic and advanced concepts in biology, chemistry, and biochemistry and apply them in problem solving.

Curriculum

BIOL 101 and 102; BIOL 302, 302L; BIOL 303; 3 hrs from BIOL 425, 460, 543, or 620; BIOL 550, 550L; CHEM 111 and 112; CHEM 321, 321L or 322,322L; CHEM 333, 331LCHEM 334, 332L; CHEM 541, 541L; CHEM545; CHEM 555=BIOL 545; CHEM 556=BIOL 546.

Measures and Criteria

In addition to the ACS certification process there are many upper level classes and milestones that could be evaluated in assessing the BIOCHEM/BS degree program. We will focus on CHEM 541L (Physical Chemistry Lab) and CHEM 555 (Biochemistry and Molecular Biology I) for this reporting period. CHEM 541L is taken by all BMB majors. As this course is taken toward the end of the student's program, assignments in CHEM 541L are designed to evaluate a broad range of knowledge and skill in the Chemistry major. The assignment in CHEM 541L most suitable for program assessment purposes is the lab report.

Student performance in CHEM 541L where knowledge of basic and advanced chemistry concepts is required will be analyzed. The department uses a grading rubric for the lab reports in CHEM 541L. Items/dimensions on the rubric indicate the specific knowledge and skills students should demonstrate as a result of successfully completing the major. The following items indicate how well students meet this learning outcome.

At least 80% of students will perform at a satisfactory level or higher on the following dimensions on selected lab reports in CHEM 541L:

1. Student demonstrates an understanding of the purpose and interpretation of an experiment.
 1. The experimental section of the lab report contains specifics about the apparatus and chemicals used, and any procedure performed, during the experiment.
2. Student uses appropriate methods for analysis and interpretation of experimental results.
 1. The results section is present and reports all the raw data collected in the laboratory without modification or manipulation.
 2. The discussion section provides an analysis of the raw data including use of propagation of errors to determine the standard deviation of calculated results to draw conclusions .

CHEM 555 is taken by all Biochemistry majors. As this course is taken toward the end of the student's program, assignments in CHEM 555 are designed to evaluate a broad range of knowledge and skill in the Biochemistry major. The assignment in CHEM 541L most suitable for program assessment purposes is the literature review written assignment.

Student performance in CHEM 555 where knowledge of basic and advanced chemistry, biology, and biochemistry concepts is required will be analyzed. The department uses a grading rubric for both written and oral assignments. Items/dimensions on the rubric indicate the specific knowledge and skills students should demonstrate as a result of successfully completing the major. The following items indicate how well students meet this learning outcome.

At least 80% of students will perform at a satisfactory level or higher on the following dimensions on selected reports in CHEM 555:

1. Justified criteria for inclusion and exclusion from review.
2. Distinguished what has been done from what needs to be done.
3. Placed the topic or problem in the broader scholarly literature
4. Placed the research in his-torical context of the field.
5. Acquired and enhanced the subject vocabulary.
6. Articulated important variables and phenomena relevant to the topic.
7. Synthesized and gained new perspective on literature.
8. Identified the main methodologies and research techniques that have been used in the field, and advantages and disadvantages of them.
9. Related ideas and theories to research methodology.
10. Rationalized the practical significance of the research problem.
11. Rationalized the scholarly significance of the research problem.
12. Written with a coherent, clear structure that supports review.

Methods

Evaluation of a selection of student lab reports for CHEM 541L, as a measure of understanding of advanced concepts will be performed. This will provide data according to the following scale from the lab report grading rubric.

SCALE: Not applicable = 0, unsatisfactory understanding = 1, satisfactory understanding = 2, excellent understanding = 3.

Evaluation of a selection of student literature review assignments from CHEM 555, as a measure of understanding of advanced concepts will be performed. This will provide data according to the following scale from the grading rubric.

SCALE: Not applicable = 0, unsatisfactory understanding = 1, satisfactory understanding = 2, excellent understanding = 3.

The data will be collected during the SPRING 2016 semester and aggregated during the SUMMER 2016 semester by the director of undergraduate studies. The department chair will review the data with faculty in the FALL 2016 semester and discuss program performance.

Results

Results

The following results are based on CHEM 541L data collected over Fall 2015 and Spring 2016.

In CHEM 541L, required for Chemistry majors, students are required to write full lab reports including Experimental, Procedure, Observation, and Results sections. In these reports students must fully describe what they did and observed and then their results and the implication of their results. They must also perform literature searches and describe how the experiment being conducted ties into current chemistry research. Descriptive details are vital in the communication of scientific data.

Evaluation of a selection of student lab reports for CHEM 541L in the Fall 2015 semester, as a measure of explaining basic and advanced concepts in chemistry and applying them in problem solving provided the following data.

Goal 1-LO1

- 1a) 86% of students achieved at least a satisfactory rating for this aim with 29% achieving an excellent rating.
- 2a) 91% of students achieved at least a satisfactory rating for this aim with 43% achieving an excellent rating
- 2b) 80% of students achieved at least a satisfactory rating for this aim with 14% achieving an excellent rating.

Evaluation of a selection of student lab reports for CHEM 541L in the Spring 2016 semester, as a measure of understanding of advanced concepts provided the following data.

Goal 1-LO1

- 1a) 88% of students achieved at least a satisfactory rating for this aim with 19% achieving an excellent rating.
- 2a) 81% of students achieved at least a satisfactory rating for this aim with 54% achieving an excellent rating
- 2b) 62% of students achieved at least a satisfactory rating for this aim with 12% achieving an excellent rating.

Overall an average of 83% of students achieved at least a satisfactory rating for this Learning Outcome. An update of this report as well as 2016-2017 data currently being collected will be included in the 2017-2018 report.

The following results are based on CHEM 555 (using CHEM 496 instead) data collected over Fall 2015 and Spring 2016.

The assessment measures for CHEM 555 change depending on the professor teaching the course. AY 2015-2016 was the first year of teaching this course as a flipped class using case studies. An update that includes AY2015-2016 and AY 2016-2017 will be included in the 2017-2018 report. Instead, we will use **CHEM 496-Undergraduate research** data from 2015-2016 as a measure for this learning outcome.

Evaluation of a selection of student lab reports for CHEM 496 in the Fall 2015 semester, as a measure of explaining advanced chemistry topics and applying them in the chemical research process provided the following data.

Goal 1-LO1

- 1a) 93% of students achieved at least a satisfactory rating for this aim with 71% achieving an excellent rating.
- 2a) 100% of students achieved at least a satisfactory rating for this aim with 93% achieving an excellent rating
- 3a) 100% of students achieved at least a satisfactory rating for this aim with 86% achieving an excellent rating.

Evaluation of a selection of student lab reports for CHEM 541L in the Spring 2016 semester, as a measure of understanding of advanced concepts provided the following data.

Goal 1-LO1

- 1a) 100% of students achieved at least a satisfactory rating for this aim with 50% achieving an excellent rating.
- 2a) 100% of students achieved at least a satisfactory rating for this aim with 83% achieving an excellent rating
- 3a) 100% of students achieved at least a satisfactory rating for this aim with 67% achieving an excellent rating.

Overall an average of 99% of students achieved at least a satisfactory rating for this Learning Outcome.

Use of Results

Students are performing as anticipated and no curriculum adjustments are recommended at this time. An update of this report as well as 2016-2017 data currently being collected and analyzed will be included in the 2017-2018 report.

Goal 2.

Students are expected to have basic computer programming and electronic literature search skills.

Curriculum

Students will apply computer applications and information retrieval skills to experiments and data analysis. These skills are taught in CHEM 541L and CSCE 102.

Learning Outcome 1.

Students will apply computer applications and information retrieval skills to experiments and data analysis. These skills are taught in CHEM 541L and CSCE 102.

Measures and Criteria

In addition to the ACS certification process there are many upper level classes and milestones that could be evaluated in assessing the BS/CHEM/BS degree program. We will focus on CHEM 541L for this reporting period.

Student performance in CHEM 541L where the application of basic computer programming and information retrieval skills is required will be analyzed. CHEM 541L is taken by all Biochemistry majors. As this course is taken toward the end of the student's program, assignments in CHEM 541L are designed to evaluate a broad range of knowledge and skill in the Biochemistry major. The assignment in CHEM 541L most suitable for program assessment purposes is the lab report. The department uses a grading rubric for the lab reports in CHEM 541L. Items/dimensions on the rubric indicate the specific knowledge and skills students should demonstrate as a result of successfully completing the major. The following dimensions indicate how well students meet this learning outcome.

At least 80% of Students will perform at a satisfactory level or higher on the following dimensions of selected lab reports in CHEM 541L:

1. The student provides the appropriate background information, including literature review, to place the experiment in context.
 1. The introduction section is clear, coherent, and relevant and contains at least three properly cited references.
2. The student uses appropriate methods for analysis and interpretation of experimental results.
 1. The Discussion provides at least one key graph or analysis for a numerical result (3pts)
 2. The discussion provides the necessary computer generated graphs and analysis for results.
 3. The Discussion uses propagation of errors to determine the standard deviation of calculated results based on the parameters that combine to give the result.

Methods

Evaluation of student lab reports for CHEM 541L, as a measure of understanding of computer programming and information retrieval, will be performed. This will provide data according to the following scale from the lab report grading rubric.

SCALE: Not applicable = 0, unsatisfactory understanding = 1, satisfactory understanding = 2, excellent understanding = 3.

The data will be collected during the SPRING 2016 semester and aggregated during the SUMMER 2016 semester by the director of undergraduate studies. The department chair will review the data with faculty in the FALL 2016 semester and discuss program performance.

Results

The following results are based on data collected over Fall 2015 and Spring 2016.

In CHEM 541L, required for Biochemistry majors, students are required to write full lab reports including Experimental, Procedure, Observation, and Results sections. In these reports students must fully describe what they did and observed and then their results and the implication of their results. They must also perform literature searches and describe how the experiment being conducted ties into current chemistry research. Descriptive details are vital in the communication of scientific data.

Evaluation of a selection of student lab reports for CHEM 541L in the Fall 2015 semester, as a measure of applying computer applications and information retrieval skills to experiments and data analysis provided the following data.

Goal 2-LO1

- 1a) 97% of students achieved at least a satisfactory rating for this aim with 83% achieving an excellent rating.
- 2a) 94% of students achieved at least a satisfactory rating for this aim with 74% achieving an excellent rating
- 2b) 91% of students achieved at least a satisfactory rating for this aim with 74% achieving an excellent rating.
- 2c) 94% of students achieved at least a satisfactory rating for this aim with 57% achieving an excellent rating.

Evaluation of a selection of student lab reports for CHEM 541L in the Spring 2016 semester, as a measure of understanding of advanced concepts provided the following data.

Goal 2-LO1

- 1a) 92% of students achieved at least a satisfactory rating for this aim with 77% achieving an excellent rating.
- 2a) 88% of students achieved at least a satisfactory rating for this aim with 77% achieving an excellent rating
- 2b) 92% of students achieved at least a satisfactory rating for this aim with 73% achieving an excellent rating.
- 2c) 77% of students achieved at least a satisfactory rating for this aim with 54% achieving an excellent rating.

Overall an average of 91% of students achieved at least a satisfactory rating for this Learning Outcome. The difference in rating between Fall and Spring is of notice and will be examined further. An update will be included in the 2017-2018 report after collecting and analyzing more data.

Use of Results

Students are performing as anticipated and no curriculum adjustments are recommended at this time. An update of this report as well as 2016-2017 data currently being collected and analyzed will be included in the 2017-2018 report.

Goal 3.

Students are expected to communicate effectively with respect to biochemical concepts, problems, and solutions.

Curriculum

All laboratory courses require reports and detailed descriptions of problems, processes, and results. Research courses require detailed descriptions of problems, processes, and results. Students prepare a seminar report in BIOL 399, CHEM 360, 496-499, and 545 and deliver it in written and oral form.

Learning Outcome 1.

Students will communicate effectively orally and in writing about biochemical concepts, problems, and solutions.

All laboratory courses require reports and detailed descriptions of problems, processes, and results. Research courses require detailed descriptions of problems, processes, and results. Students prepare an oral and written report in 545.

Measures and Criteria

In addition to the ACS certification process there are many upper level classes and milestones that could be evaluated in assessing the BIOCHEM/BS degree program. We will focus on CHEM 541L and CHEM 545 for this reporting period.

Student performance in CHEM 541L where communication of chemistry experiments, data and results is required will be analyzed. CHEM 541L is taken by all Biochemistry majors. As this course is taken toward the end of the student's program, assignments in CHEM 541L are designed to evaluate a broad range of knowledge and skill in the Biochemistry major. The assignment in CHEM 541L most suitable for program assessment purposes is the lab report. The department uses a grading rubric for the lab reports in CHEM 541L. Items/dimensions on the rubric indicate the specific knowledge and skills students should demonstrate as a result of successfully completing the major. The following items indicate how well students meet this learning outcome.

At least 80% of Students will perform at a satisfactory level or higher on the following dimensions on selected lab reports in CHEM 541L:

1. The student provides the appropriate background information, including literature review if necessary, to place the experiment in context.
 1. The introduction section is clear, coherent, and relevant and contains at least two properly cited references.
2. Student summarizes and presents data in response to the experiment objectives.
 1. The discussion section exists and describes any equations used for the interpretation of the data and provides at least one key graph or analysis for a numerical result.
3. Student demonstrates evidence of systematic and thorough documentation of experimental detail.
 1. The experiment section of the lab report contains specifics about the apparatus and chemicals used and any procedure performed during the experiment.

The students will also deliver an oral literature review seminar in CHEM 545. Student performance in CHEM 545 where knowledge of basic and advanced chemistry, biology, and biochemistry concepts is required will be analyzed. The department uses a grading rubric for both written and oral assignments. Items/dimensions on the rubric indicate the specific knowledge and skills students should demonstrate as a result of successfully completing the major. The following items indicate how well students meet this learning outcome.

At least 80% of Students will perform at a satisfactory level or higher on the following dimensions on selected oral reports in CHEM 545:

1. Justified criteria for inclusion and exclusion from written and oral reports.
2. Distinguished what has been done from what needs to be done.
3. Placed the topic or problem in the broader scholarly literature
4. Placed the research in his-torical context of the field.
5. Acquired and enhanced the subject vocabulary.
6. Articulated important variables and phenomena relevant to the topic.
7. Synthesized and gained new perspective on literature.
8. Identified the main methodologies and research techniques that have been used in the field, and advantages and disadvantages of them.
9. Related ideas and theories to research methodology.
10. Rationalized the practical significance of the research problem.

11. Rationalized the scholarly significance of the research problem.
12. Written with a coherent, clear structure that supports the literature.

Methods

Evaluation of selected student lab reports for CHEM 541L, as a measure of understanding of the communication of chemistry experiments and data analysis, will be performed. This will provide data according to the following scale from the lab report grading rubric.

SCALE: Not applicable = 0, unsatisfactory understanding = 1, satisfactory understanding = 2, excellent understanding = 3.

Evaluation of selected student oral reports for CHEM 545, as a measure of understanding of the communication of biochemistry experiments and data analysis, will be performed. This will provide data according to the following scale from the grading rubric.

SCALE: Not applicable = 0, unsatisfactory understanding = 1, satisfactory understanding = 2, excellent understanding = 3.

The data will be collected during the SPRING 2016 semester and aggregated during the SUMMER 2016 semester by the director of undergraduate studies. The department chair will review the data with faculty in the FALL 2016 semester and discuss program performance.

Results

The following results are based on data collected over Fall 2015 and Spring 2016.

In CHEM 541L, required for Biochemistry majors, students are required to write full lab reports including Experimental, Procedure, Observation, and Results sections. In these reports students must fully describe what they did and observed and then their results and the implication of their results. They must also perform literature searches and describe how the experiment being conducted ties into current chemistry research. Descriptive details are vital in the communication of scientific data.

Evaluation of a selection of student lab reports for CHEM 541L in the Fall 2015 semester, as a measure of effectively writing about chemistry concepts, principles, and processes provided the following data.

Goal 3-LO1

- 1a) 80% of students achieved at least a satisfactory rating for this aim with 31% achieving an excellent rating.
- 2a) 86% of students achieved at least a satisfactory rating for this aim with 34% achieving an excellent rating
- 3a) 91% of students achieved at least a satisfactory rating for this aim with 66% achieving an excellent rating.

Evaluation of a selection of student lab reports for CHEM 541L in the Spring 2016 semester, as a measure of understanding of advanced concepts provided the following data.

Goal 3-LO1

- 1a) 88% of students achieved at least a satisfactory rating for this aim with 8% achieving an excellent rating.
- 2a) 77% of students achieved at least a satisfactory rating for this aim with 19% achieving an excellent rating
- 3a) 81% of students achieved at least a satisfactory rating for this aim with 69% achieving an excellent rating.

Overall an average of 99% of students achieved at least a satisfactory rating for this Learning Outcome. An update will be included in the 2017-2018 report after collecting and analyzing more data.

Use of Results

Students are performing as anticipated and no curriculum adjustments are recommended at this time, however, low performance aims are of interest and will be assessed further. The difference in performance between Fall and Spring is of notice and will be examined further. An update of this report as well as 2016-2017 data currently being collected will be included in the 2017-2018 report.

II. FUTURE ASSESSMENT PLAN FOR 2017 - 2018

Mission Statement

The Mission of Department of Chemistry and Biochemistry includes offering a high quality education with state-of-the art training in Chemistry. The department offers three undergraduate degree programs. The B.S. in Chemistry is provided for students who are interested in chemistry graduate school or work in the chemical industry at the bachelors level. The B.S. with a major in Chemistry is for students interested in teaching or in chemistry related fields such as pharmacy or medicine. The new B.S. with a major in Biochemistry and Molecular Biology is for students interested in medical, biochemical, or biological science fields.

Goal 1.

Students are expected to achieve basic mastery of chemical, biological, and biochemical concepts, theories and problems.

Curriculum

BIOL 101 and 102; BIOL 302, 302L; BIOL 303; 3 hrs from BIOL 425, 460, 543, or 620; BIOL 550, 550L; CHEM 111 and 112; CHEM 321, 321L; CHEM 333, 331LCHEM 334, 332L; CHEM 541, 541L; CHEM545; CHEM 555=BIOL 545; CHEM 556=BIOL 546.

Learning Outcome 1.

Students will explain basic and advanced concepts in biology, chemistry, and biochemistry and apply them in problem solving.

Curriculum

BIOL 101 and 102; BIOL 302, 302L; BIOL 303; 3 hrs from BIOL 425, 460, 543, or 620; BIOL 550, 550L; CHEM 111 and 112; CHEM 321, 321L or 322,322L; CHEM 333, 331LCHEM 334, 332L; CHEM 541, 541L; CHEM545; CHEM 555=BIOL 545; CHEM 556=BIOL 546.

Measures and Criteria

In addition to the ACS certification process there are many upper level classes and milestones that could be evaluated in assessing the BIOCHEM/BS degree program. We will focus on CHEM 541L (Physical Chemistry Lab) and CHEM 555 (Biochemistry and Molecular Biology I) for this reporting period. CHEM 541L is taken by all BMB majors. As this course is taken toward the end of the student's program, assignments in CHEM 541L are designed to evaluate a broad range of knowledge and skill in the Chemistry major. The assignment in CHEM 541L most suitable for program assessment purposes is the lab report.

Student performance in CHEM 541L where knowledge of basic and advanced chemistry concepts is required will be analyzed. The department uses a grading rubric for the lab reports in CHEM 541L. Items/dimensions on the rubric indicate the specific knowledge and skills students should demonstrate as a result of successfully completing the major. The following items indicate how well students meet this learning outcome.

At least 80% of students will perform at a satisfactory level or higher on the following dimensions on selected lab reports in CHEM 541L:

1. Student demonstrates an understanding of the purpose and interpretation of an experiment.
 1. The experimental section of the lab report contains specifics about the apparatus and chemicals used, and any procedure performed, during the experiment.
 2. Student uses appropriate methods for analysis and interpretation of experimental results.
 1. The results section is present and reports all the raw data collected in the laboratory without modification or manipulation.
 2. The discussion section provides an analysis of the raw data including use of propagation of errors to determine the standard deviation of calculated results to draw conclusions .

CHEM 555 is taken by all Biochemistry majors. As this course is taken toward the end of the student's program, assignments in CHEM 555 are designed to evaluate a broad range of knowledge and skill in the Biochemistry major. The assignment in CHEM 541L most suitable for program assessment purposes is the literature review written assignment.

Student performance in CHEM 555 where knowledge of basic and advanced chemistry, biology, and biochemistry concepts is required will be analyzed. The department uses a grading rubric for both written and oral assignments. Items/dimensions on the rubric indicate the specific knowledge and skills students should demonstrate as a result of successfully completing the major. The following items indicate how well students meet this learning outcome.

At least 80% of students will perform at a satisfactory level or higher on the following dimensions on selected reports in CHEM 555:

1. Justified criteria for inclusion and exclusion from review.
2. Distinguished what has been done from what needs to be done.
3. Placed the topic or problem in the broader scholarly literature
4. Placed the research in his-torical context of the field.
5. Acquired and enhanced the subject vocabulary.
6. Articulated important variables and phenomena relevant to the topic.
7. Synthesized and gained new perspective on literature.
8. Identified the main methodologies and research techniques that have been used in the field, and advantages and disadvantages of them.
9. Related ideas and theories to research methodology.

10. Rationalized the practical significance of the research problem.
11. Rationalized the scholarly significance of the research problem.
12. Written with a coherent, clear structure that supports review.

Methods

Evaluation of a selection of student lab reports for CHEM 541L, as a measure of understanding of advanced concepts will be performed. This will provide data according to the following scale from the lab report grading rubric.

SCALE: Not applicable = 0, unsatisfactory understanding = 1, satisfactory understanding = 2, excellent understanding = 3.

Evaluation of a selection of student literature review assignments from CHEM 555, as a measure of understanding of advanced concepts will be performed. This will provide data according to the following scale from the grading rubric.

SCALE: Not applicable = 0, unsatisfactory understanding = 1, satisfactory understanding = 2, excellent understanding = 3.

The data will be collected during the SPRING 2016 semester and aggregated during the SUMMER 2016 semester by the director of undergraduate studies. The department chair will review the data with faculty in the FALL 2016 semester and discuss program performance.

Goal 2.

Students are expected to have basic computer programming and electronic literature search skills.

Curriculum

Students will apply computer applications and information retrieval skills to experiments and data analysis. These skills are taught in CHEM 541L and CSCE 102.

Learning Outcome 1.

Students will apply computer applications and information retrieval skills to experiments and data analysis. These skills are taught in CHEM 541L and CSCE 102.

Measures and Criteria

In addition to the ACS certification process there are many upper level classes and milestones that could be evaluated in assessing the BS/CHEM/BS degree program. We will focus on CHEM 541L for this reporting period.

Student performance in CHEM 541L where the application of basic computer programming and information retrieval skills is required will be analyzed. CHEM 541L is taken by all Biochemistry majors. As this course is taken toward the end of the student's program, assignments in CHEM 541L are designed to evaluate a broad range of knowledge and skill in the Biochemistry major. The assignment in CHEM 541L most suitable for program assessment purposes is the lab report. The department uses a grading rubric for the lab reports in CHEM 541L. Items/dimensions on the rubric indicate the specific knowledge and skills students should demonstrate as a result of successfully completing the major. The following dimensions indicate how well students meet this learning outcome.

At least 80% of Students will perform at a satisfactory level or higher on the following dimensions of selected lab reports in CHEM 541L:

1. The student provides the appropriate background information, including literature review, to place the experiment in context.
 1. The introduction section is clear, coherent, and relevant and contains at least three properly cited references.
2. The student uses appropriate methods for analysis and interpretation of experimental results.
 1. The Discussion provides at least one key graph or analysis for a numerical result (3pts)
 2. The discussion provides the necessary computer generated graphs and analysis for results.
 3. The Discussion uses propagation of errors to determine the standard deviation of calculated results based on the parameters that combine to give the result.

Methods

Evaluation of student lab reports for CHEM 541L, as a measure of understanding of computer programming and information retrieval, will be performed. This will provide data according to the following scale from the lab report grading rubric.

SCALE: Not applicable = 0, unsatisfactory understanding = 1, satisfactory understanding = 2, excellent understanding = 3.

The data will be collected during the SPRING 2016 semester and aggregated during the SUMMER 2016 semester by the director of undergraduate studies. The department chair will review the data with faculty in the FALL 2016 semester and discuss program performance.

Goal 3.

Students are expected to communicate effectively with respect to biochemical concepts, problems, and solutions.

Curriculum

All laboratory courses require reports and detailed descriptions of problems, processes, and results. Research courses require detailed descriptions of problems, processes, and results. Students prepare a seminar report in BIOL 399, CHEM 360, 496-499, and 545 and deliver it in written and oral form.

Learning Outcome 1.

Students will communicate effectively orally and in writing about biochemical concepts, problems, and solutions.

All laboratory courses require reports and detailed descriptions of problems, processes, and results. Research courses require detailed descriptions of problems, processes, and results. Students prepare an oral and written report in 545.

Measures and Criteria

In addition to the ACS certification process there are many upper level classes and milestones that could be evaluated in assessing the BIOCHEM/BS degree program. We will focus on CHEM 541L and CHEM 545 for this reporting period.

Student performance in CHEM 541L where communication of chemistry experiments, data and results is required will be analyzed. CHEM 541L is taken by all Biochemistry majors. As this course is taken toward the end of the student's program, assignments in CHEM 541L are designed to evaluate a broad range of knowledge and skill in the Biochemistry major. The assignment in CHEM 541L most suitable for program assessment purposes is the lab report. The department uses a grading rubric for the lab reports in CHEM 541L. Items/dimensions on the rubric indicate the specific knowledge and skills students should demonstrate as a result of successfully completing the major. The following items indicate how well students meet this learning outcome.

At least 80% of Students will perform at a satisfactory level or higher on the following dimensions on selected lab reports in CHEM 541L:

1. The student provides the appropriate background information, including literature review if necessary, to place the experiment in context.
 1. The introduction section is clear, coherent, and relevant and contains at least two properly cited references.
2. Student summarizes and presents data in response to the experiment objectives.
 1. The discussion section exists and describes any equations used for the interpretation of the data and provides at least one key graph or analysis for a numerical result.
3. Student demonstrates evidence of systematic and thorough documentation of experimental detail.
 1. The experiment section of the lab report contains specifics about the apparatus and chemicals used and any procedure performed during the experiment.

The students will also deliver an oral literature review seminar in CHEM 545. Student performance in CHEM 545 where knowledge of basic and advanced chemistry, biology, and biochemistry concepts is required will be analyzed. The department uses a grading rubric for both written and oral assignments. Items/dimensions on the rubric indicate the specific knowledge and skills students should demonstrate as a result of successfully completing the major. The following items indicate how well students meet this learning outcome.

At least 80% of Students will perform at a satisfactory level or higher on the following dimensions on selected oral reports in CHEM 545:

1. Justified criteria for inclusion and exclusion from written and oral reports.
2. Distinguished what has been done from what needs to be done.
3. Placed the topic or problem in the broader scholarly literature
4. Placed the research in his-torical context of the field.
5. Acquired and enhanced the subject vocabulary.
6. Articulated important variables and phenomena relevant to the topic.
7. Synthesized and gained new perspective on literature.
8. Identified the main methodologies and research techniques that have been used in the field, and advantages and disadvantages of them.
9. Related ideas and theories to research methodology.
10. Rationalized the practical significance of the research problem.
11. Rationalized the scholarly significance of the research problem.
12. Written with a coherent, clear structure that supports the literature.

Methods

Evaluation of selected student lab reports for CHEM 541L, as a measure of understanding of the communication of chemistry experiments and data analysis, will be performed. This will provide data according to the following scale from the lab report grading rubric.

SCALE: Not applicable = 0, unsatisfactory understanding = 1, satisfactory understanding = 2, excellent understanding = 3.

Evaluation of selected student oral reports for CHEM 545, as a measure of understanding of the communication of biochemistry experiments and data analysis, will be performed. This will provide data according to the following scale from the grading rubric.

SCALE: Not applicable = 0, unsatisfactory understanding = 1, satisfactory understanding = 2, excellent understanding = 3.

The data will be collected during the SPRING 2016 semester and aggregated during the SUMMER 2016 semester by the director of undergraduate studies. The department chair will review the data with faculty in the FALL 2016 semester and discuss program performance.