

Assessment Plan for BS in Chemistry

Mission

The mission of the B.S. in Chemistry is to provide students a high-quality foundation of study in areas of analytical, inorganic, organic, physical, polymer, and biochemistry. Through faculty-directed, hands-on, laboratory and independent research opportunities, students integrate formal classroom knowledge to address real-world chemistry related issues. Our ACS-certified Chemistry Degree prepares undergraduate students for career opportunities in industry and government. In addition they are well prepared for graduate studies in chemistry, chemistry related disciplines and professional programs such as medicine, dentistry, pharmacy, forensics, and law.

Program Learning Objectives (PLOs)

Discipline-specific knowledge:

1. Graduates will understand Chemistry based on principles of basic sciences and mathematics, preparing them for careers, graduate school, or professional school.
2. Graduates will acquire laboratory and data analysis skills required for careers in Chemistry, graduate or professional school through laboratory courses and independent student research.

Communication

3. Graduates will communicate effectively and professionally through written and oral means on aspects of Chemistry.

Critical Thinking

4. Graduates will master problem-solving skills in Chemistry.

Student Learning Outcomes (SLO)

Discipline-specific knowledge:

- 1a. Graduates will demonstrate understanding of mathematics and physics
- 1b. Graduates will demonstrate understanding of areas of Chemistry, including analytical, biochemistry, inorganic, organic and physical.
2. Graduates will demonstrate laboratory and data analysis skills commensurate with entry-level positions and graduate and professional schools.

Communication

- 3a. Graduates can give effective oral presentations on an aspect of Chemistry learned from course work, the literature, or laboratory research.
- 3b. Graduates can compose effective written presentations on an aspect of Chemistry learned from course work, the literature, or laboratory research.

Critical Thinking

- 4a. Graduates will demonstrate mastery of problem-solving skills in Chemistry.
- 4b. Graduates will demonstrate the ability to integrate problem-solving skills into research-related problems.

Assessment Measures

Discipline-specific knowledge:

1. Applied Biological Sciences Basic and Advanced Knowledge

In their final semester before graduation students will take the American Chemical Society (ACS) Diagnostic of Undergraduate Chemistry Knowledge (DUCK) exam and perform at or above the national mean on this exam. This exam, designed to be taken at the end of a four-year undergraduate curriculum, requires knowledge from more than one traditional area of chemistry and provides an excellent assessment measure of comprehensive chemistry knowledge.

2. Chemistry Laboratory-Based Knowledge

Students will attain a rating of proficient or exemplary in describing and analyzing laboratory experiences by synthesizing this into Laboratory Notebooks or Laboratory Reports.

Communication

3. Written Presentation:

Students will attain 80% or better on their final written presentation in CHEM 328L and CHEM 370.

4. Oral presentation:

Students will attain 80% or better on their final oral presentation in CHEM 370, CHM 452, and CHEM 465.

Critical Thinking

5. Problem Solving:

Students will perform at or above the national mean on the DUCK exam.

6. Integration of Problem Solving Skills in Research:

Students will attain 80% or better on their research experience in CHEM 452L or CHEM 498 Undergraduate Research.

Curriculum maps showing the alignment of outcomes to courses are on the following two pages.

CURRICULUM (PROGRAM) MAPPING

Name of Degree Program: CHEMISTRY

| PROGRAM-LEVEL STUDENT LEARNING OUTCOMES | CHEM 111 | CHEM 112+14 | CHEM 112L | CHEM 114L | CHEM 352 | CHEM 326 + 328 | CHEM 326L + 328L | CHEM 332 | CHEM 332L | CHEM 342 + 344 | CHEM 344L | CHEM 434 | CHEM 434L |
|--|----------|-------------|-----------|-----------|----------|----------------|------------------|----------|-----------|----------------|-----------|----------|-----------|
| Discipline Specific Knowledge/Skills | | | | | | | | | | | | | |
| 1a. Graduates will demonstrate understanding of mathematics and physics. | | I | I | I | | | | | | R | R | R | |
| 1b. Graduates will demonstrate understanding of areas of Chemistry, including analytical, biochemistry, inorganic, organic and physical. | I | I | I | I | I | R+E | R | I+R | I+R | I+R | I+R | I+R | I+R |
| 2. Graduates will demonstrate laboratory and data analysis skills commensurate with entry-level positions in industry and graduate and professional schools. | I | | I | I | | | R | | R+E | | I+R | | E |
| Communication | | | | | | | | | | | | | |
| 3a. Graduates can give effective oral presentations on an aspect of Chemistry learned from course work, the literature, or laboratory research. | I | | | | | | | | | | | | |
| 3b. Graduates can compose effective written presentations on an aspect of Chemistry learned from course work, the literature, or laboratory research. | I | | | | | | R | | | | | | E |
| Critical Thinking | | | | | | | | | | | | | |
| 4a. Graduates will demonstrate mastery of problem-solving skills in Chemistry. | | | | I | R | | I (328L) | I+R | I+R | I+R | I+R | R | R |
| 4b. Graduates will demonstrate the ability to integrate problem-solving skills into research-related problems. | | | | | | | | | | | | | |

I = Introduction/Novice ; R = Reinforced (PLO had been introduced earlier in the curriculum, and is now being reinforced); E= Emphasis (the PLO is mastered)

| PROGRAM-LEVEL STUDENT LEARNING OUTCOMES | CHEM 452 | CHEM 452L | CHEM 482 | CHEM 420 | CHEM 421 | CHEM 426 | CHEM 464 | CHEM 465 | CHEM 370 | CHEM 498 |
|--|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1a. Graduates will demonstrate understanding of mathematics and physics. | R | | | | | | | R | | |
| 1b. Graduates will demonstrate understanding of areas of Chemistry, including analytical, biochemistry, inorganic, organic and physical. | E | E | R+E | E | R+E | R+E | I+R | R+E | I+R | R+E |
| 2. Graduates will demonstrate laboratory and data analysis skills commensurate with entry-level positions in industry and graduate and professional schools. | R+E | R+E | | | R | | | | | R+E |
| 3a. Graduates can give effective oral presentations on an aspect of Chemistry learned from course work, the literature, or laboratory research. | R+E | | E | | | | | | R | E |
| 3b. Graduates can compose effective written presentations on an aspect of Chemistry learned from course work, the literature, or laboratory research. | R+E | E | R | | | | | | R | R+E |
| 4a. Graduates will demonstrate mastery of problem-solving skills in Chemistry. | R+E | R+E | | R+E | R | R | R | R | R | R+E |
| 4b. Graduates will demonstrate the ability to integrate problem-solving skills into research-related problems. | | | | | | | | | | R+E |

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