

School of Sciences
Chemistry/Biochemistry (B.A./B.S.) Assessment (2020-2025)

I. Mission statement

I. Introduction and mission statements

The Bachelor of Science degrees in Chemistry and Biochemistry are currently offered within the IU Kokomo School of Sciences. The Biochemistry degrees were initiated in the fall of 2012 and implemented concurrently with BA in Chemistry that has been initiated in 2006. Equivalent BS degrees are also offered at other IU campuses. The programs were originally created at IUB and IUPUI.

Mission Statement: The Bachelor of Science degrees in Chemistry and Biochemistry are designed to provide students with the background needed for science-related industrial and academic positions, for entry into chemistry graduate programs or professional programs (such as medicine, veterinary, dentistry, optometry) and, if coupled with the appropriate graduate certificates in secondary education, the graduates will be capable of teaching high school chemistry. The mission is consistent with the IU Kokomo Mission Statement.

II. Program goals and learning outcomes

Student Learning Outcomes and Components:

Goal I: Knowledge and understanding of the theoretical basis of chemistry.

Outcome 1: Students will be able to connect observations with prior information.

Components:

1. Prediction of chemical reaction products
2. Identification of chemical reaction products

Outcome 2: Students will be able to explain the physical and chemical properties of substances based on an understanding of atomic and molecular structure.

Components:

1. Explanation of physical properties
2. Explanation of chemical properties

Outcome 3: Students will perform quantitative calculations using experimental data.

Components:

1. Selection of an appropriate theoretical relationship/equation for data analysis.
2. Completion of quantitative calculations

3. Explanation of the significance and/or validity of the results.

Goal II: Laboratory Work and Performance

Outcome 4: Students will demonstrate the understanding and ability to carry out laboratory procedures effectively and safely.

Components:

1. Explanation of the purpose of the steps in a laboratory procedure.
2. Use of standard laboratory equipment and instrumentation properly and safely.

Outcome 5: Students will collect, analyze, and draw relevant conclusions from experimental data.

Components:

1. Collection and organization of relevant data.
2. Analyze experimental data appropriately.
3. Interpretation of processed data.
4. Identification of experimental errors.

Outcome 6: Design procedures appropriate to the goal of an investigation.

Components:

1. Selection of a suitable experimental approach.
2. Modification of the approach to optimize the experimental outcome.

Goal III: Application of Quantitative Reasoning Skills and Critical Thinking to Problem Solving

Outcome 7: Students will learn to organize relevant information for analysis.

Components:

1. Identification of critical data elements necessary to understand the problem
2. Identification of applicable theories and/or mathematical relationships

Outcome 8: Students will calculate quantitative values and/or formulate an explanation of observations.

Components:

1. Application of theories to illustrate how observations can be understood
2. Application of equations to determine mathematical values with appropriate significant figures and units

Outcome 9: Students will draw conclusions from quantitative values and/or experimental observations.

Component:

1. Correlation of quantitative results to chemical and/or physical properties of the system.

III. Curriculum map

Outcomes: Student will	C 105 General Chem I	C 106 General Chem II	C 125 Gen Chem Lab I	C 126 Gen Chem Lab II	C 250 Intro to Genomics	C 310 Instrumental	C 311 Instrumental	C 329 Biochemistry I	C 340 Biochemistry II	C 341 Organic	C 342 Organic II	C 343 Organic Lab I	C 344 Organic Lab II	C 361 Physical Chem	C 409 Research	C 430 Inorganic Chem	C 443 Org Spectroscopy
1. Connect observations with prior information	I	I		E	E	R	R	R	R	R	R	R	R	R			R
2 Explain the physical and chemical properties of substances based on an understanding of atomic and molecular structure	I	I	E					R	R	R	R		R				R
3. Perform quantitative calculations using experimental data	I	I	E	E					R			R	R				
4. Demonstrate the understanding and ability to carry out laboratory procedures effectively and safely			I	I		E	E	R	R			R	R		R		
5. Collect, analyze, and draw relevant conclusions from experimental data			I	I	E	E	E	R	R				R		R		R
6. Design procedures appropriate to the goal of an investigation					I	E	E	R	R				I		I		R
7. Organize relevant information for analysis	I	I	I	I	E			R	R		R	R	R	R	R		R
8. Calculate quantitative values and/or formulate an explanation of observations	I	I	I	I		E		R	R		R	R	R	R		R	
9. Draw conclusions from quantitative values and/or experimental observations				I	E	E		R	R	R	R	R	R	R	R		R

The following summary provides an overview of the alignment of each Outcome to the curriculum. This indicates where Outcomes are introduced (I), expanded upon (E), and reinforced (R).

II. Assessment Plan

A plan that documents which outcomes will be assessed, the measures used to assess them, and the target achievement level for those measures. (Academic Years: 2020-2025)

Academic Year (template)	
Student Learning Outcomes	Which outcomes are being assessed this academic year? (All outcomes can be assessed each year.)
Measure Description	What assessment tools will be used? Why these tools? When/where will the assessments take place? How does this time and place align with the outcomes? What students are being assessed? Why these students?
Benchmark/Target	What level of performance will be considered acceptable? What performance criteria is used to determine mastery?

Academic Year 2020-2021

Student Learning Outcomes

Learning outcome 1: Students will be able to connect observations with prior information
Learning outcome 4: Students will demonstrate the understanding and ability to carry out laboratory procedures effectively and safely.
Learning outcome 7: Students will learn to organize relevant information for analysis

Measure Description

What assessment tools will be used? Why these tools? When/where will the assessments take place? How does this time and place align with the outcomes?
What students are being assessed? Why these students?

These learning outcomes will be assessed in CHEM-C 105, CHEM-C 106, CHEM-C125, CHEM-C 126, CHEM-C 250, CHEM-C 310, CHEM-C 311, CHEM-C 329, CHEM-C 340, CHEM-C 341, CHEM-C 342, CHEM-C 343, CHEM-C 344, CHEM-C 361, CHEM-C 409, and CHEM-C 443, These courses are offered in 2020-21 and are mapped to these learning outcomes. These courses provide a broad range of lower-level and upper-level chemistry courses for the majors. The assessment will be done using final exam questions and lab reports as they are typically more comprehensive in nature.

Benchmark/Target

What level of performance will be considered acceptable? What performance criteria is used to determine mastery?

The equivalent of a grade of C or above in the assessment tool (e.g., 7 out of 10 on a problem) will be considered an acceptable performance.

Academic Year 2021-2022

Student Learning Outcomes

Learning outcome 2: Students will be able to explain the physical and chemical properties of substances based on an understanding of atomic and molecular structure.

Learning outcome 5: Students will collect, analyze, and draw relevant conclusions from experimental data.

Learning outcome 8: Students will calculate quantitative values and/or formulate an explanation of observations.

Measure Description

What assessment tools will be used? Why these tools? When/where will the assessments take place? How does this time and place align with the outcomes? What students are being assessed? Why these students?

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Benchmark/Target

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Academic Year 2022-2023

Student Learning Outcomes

Learning outcome 3: Students will perform quantitative calculations using experimental data.
Learning outcome 6: Design procedures appropriate to the goal of an investigation.
Learning outcome 9: Students will draw conclusions from quantitative values and/or experimental observations.

Measure Description

What assessment tools will be used? Why these tools? When/where will the assessments take place? How does this time and place align with the outcomes? What students are being assessed? Why these students?

These learning outcomes will be assessed in CHEM-C 105, CHEM-C 106, CHEM-C125, CHEM-C 126, CHEM-C 250, CHEM-C 310, CHEM-C 311, CHEM-C 329, CHEM-C 340, CHEM-C 341, CHEM-C 342, CHEM-C 343, CHEM-C 344, CHEM-C 361, CHEM-C 409, and CHEM-C 443, These courses are offered in 2020-21 and are mapped to these learning outcomes. These courses provide a broad range of lower-level and upper-level chemistry courses for the majors. The assessment will be done using final exam questions and lab reports as they are typically more comprehensive in nature.

Benchmark/Target

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Academic Year 2023-2024

Student Learning Outcomes

Learning outcome 1: Students will be able to connect observations with prior information
Learning outcome 4: Students will demonstrate the understanding and ability to carry out laboratory procedures effectively and safely.
Learning outcome 7: Students will learn to organize relevant information for analysis

Measure Description

What assessment tools will be used? Why these tools? When/where will the assessments take place? How does this time and place align with the outcomes?
What students are being assessed? Why these students?

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Benchmark/Target

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Academic Year 2024-2025

Student Learning Outcomes

Learning outcome 2: Students will be able to explain the physical and chemical properties of substances based on an understanding of atomic and molecular structure.

Learning outcome 5: Students will collect, analyze, and draw relevant conclusions from experimental data.

Learning outcome 8: Students will calculate quantitative values and/or formulate an explanation of observations.

Measure Description

What assessment tools will be used? Why these tools? When/where will the assessments take place? How does this time and place align with the outcomes? What students are being assessed? Why these students?

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