School of Sciences
Biological and Physical Sciences Degree (B.A./B.S.)
Assessment (2020-2025)

I. Mission statement

The mission the Biological and Physical Science (BIPH) program is to provide a broad background in the sciences, mathematics and informatics that is uniquely suited to a student's specific educational needs, and to prepare students for entrance/admission to professional programs (medicine, dentistry, optometry, etc.). The mission is consistent with the IU Kokomo Mission Statement.

II. Student learning outcomes

Learning outcomes related to understanding scientific truth

Learning Outcome 1: Students will explain the role of data collection and analysis in the development of scientific knowledge
Learning Outcome 2: Students will explain the self-correcting nature of science
Learning Outcome 3: Students will collect meaningful data from an experiment
Learning Outcome 4: Students will apply mathematical techniques to analyze collected data using current technology
Learning Outcome 5: Students will draw relevant conclusions from experimental results

Learning outcomes related to communicating in the scientific tradition

Learning Outcome 6: Students will utilize scientific terminology correctly
Learning Outcome 7: Students will express the results of scientific work clearly and concisely
Learning Outcome 8: Students will explain the solutions to problems using correct mathematical vocabulary and mathematical notation

Learning outcomes related to basic principles of the biological sciences OR the physical sciences OR the mathematical sciences OR informatics.

Learning outcomes for Biology
Learning Outcome 9: Students will explain similar/identical features of living systems
Learning Outcome 10: Students will explain biodiversity
Learning Outcome 11: Students will describe the cellular and molecular basis of genetics

Learning outcomes for the Physical Sciences
Learning Outcome 12: Students will explain the relationship between the structure of substances and their physical properties and reactivity at the molecular and atomic levels
Learning Outcome 13: Students will explain the interaction of the forces of nature, such as electromagnetism, gravity, and nuclear forces
Learning Outcome 14: Students will explain the unifying principle of plate tectonics and how it relates to the origin of Earth's physical phenomena, including rocks, volcanoes, and earthquakes

Outcome for the Mathematical Sciences
Learning Outcome 15: Students will perform algorithmic and logical procedures
Learning Outcome 16: Students will interpret the results of their computations
Learning Outcome 17: Students will use appropriate technology
Learning Outcome 18: Students will formulate a hypothesis and determine its validity

Outcome for Informatics
Learning Outcome 19: Students will utilize computing terminology correctly
Learning Outcome 20: Students will explain benefits/risks of technology reliance in society
Learning Outcome 21: Students will use fundamental programming elements

III. Curriculum map (I = Introduced; D = Developed, M = Mastered)

	BIOL- L 105	BIOL- L 211	BIOL- L 213	BIOL- L 345	BIOL- L 364	BIOL- L 403	CHEM- C 105	CHEM- C 106	CHEM- C 125	CHEM- C 126	CHEM- C210	CHEM- C 211	GEOL- G 100	GEOL- G 133	GEOL- G 326	GEOL- G 400
1: explain the role of data collection and analysis in the development of scientific knowledge		I				M	I	D					I	I		
2: explain the self-correcting nature of science		I				M	I	D						II		
3: collect meaningful data from an experiment									I	D						
4: apply mathematical techniques to analyze collected data using current technology												I				
5: draw relevant conclusions from experimental results									I	D						
6: utilize scientific terminology correctly	I					M			I				I	I		
7: express the results of scientific work clearly and concisely	I (LAB)					M				D						
8: explain the solutions to problems using correct mathematical vocabulary and mathematical notation																
9: explain similar/identical features of living systems	I			D												
10: explain biodiversity																

	BIOL- L 105	BIOL- L 211	BIOL- L 213	BIOL- L 345	BIOL- L 364	BIOL- L 403	CHEM- C 105	CHEM- C 106	CHEM- C 125	CHEM- C 126	CHEM- C210	CHEM- C 211	GEOL- G 100	GEOL- G 133	GEOL- G 326	GEOL- G 400
11: describe the cellular and molecular basis of genetics		I			D											
12: explain the relationship between the structure of substances and their physical properties and reactivity at the molecular and atomic levels							I	D			D					
13: explain the interaction of the forces of nature, such as electromagnetism, gravity, and nuclear forces																
14: explain the unifying principle of plate tectonics and how it relates to the origin of Earth's physical phenomena, including rocks, volcanoes, and earthquakes													I	I	D	D
15: perform algorithmic and logical procedures																
16: interpret the results of their computations																
17: use appropriate technology																
18: formulate a hypothesis and determine its validity																
19: utilize computing terminology correctly																

	BIOL- L 105	BIOL- L 211	BIOL- L 213	BIOL- L 345	BIOL- L 364	BIOL- L 403	CHEM- C 105	CHEM- C 106	CHEM- C 125	CHEM- C 126	CHEM- C210	CHEM- C 211	GEOL- G 100	GEOL- G 133	GEOL- G 326	GEOL- G 400
20: explain benefits/risks of technology reliance in society																
21: use fundamental programming elements																

	MATH-M 215	MATH-M 216	MATH-M 303	MATH-M 311	MATH-M 360	MATH-M 366	MICR-M310	PHSL–P 416	PHYS–P 100	PHYS–P 201	PHYS–P 202	PHYS–P 221	PHYS–P 222	ZOOL-Z315
1: explain the role of data collection and analysis in the development of scientific knowledge									I	I	D	I	D	
2: explain the self-correcting nature of science														
3: collect meaningful data from an experiment														
4: apply mathematical techniques to analyze collected data using current technology														
5: draw relevant conclusions from experimental results														
6: utilize scientific terminology correctly										I	I			
7: express the results of scientific work clearly and concisely										I	I	D (LAB)		
8: explain the solutions to problems using correct mathematical vocabulary and mathematical notation	I	I	I	I	D	D								
9: explain similar/identical features of living systems								D						I
10: explain biodiversity							I							
11: describe the cellular and molecular basis of genetics														
12: explain the relationship between the structure of substances and their physical properties and reactivity at the molecular and atomic levels														
13: explain the interaction of the forces of nature, such as electromagnetism, gravity, and nuclear forces									I	D	D	D	D	
14: explain the unifying principle of plate tectonics and how it relates to the origin of Earth's physical phenomena, including														

	MATH-M 215	MATH-M 216	MATH-M 303	MATH-M 311	MATH-M 360	MATH-M 366	MICR-M310	PHSL–P 416	PHYS–P 100	PHYS–P 201	PHYS–P 202	PHYS–P 221	PHYS–P 222	ZOOL-Z315
rocks, volcanoes, and earthquakes														
15: perform algorithmic and logical procedures*	I	D		D	D									
16: interpret the results of their computations														
17: use appropriate technology**	I	I		D	D	M								
18: formulate a hypothesis and determine its validity***			I											
19: utilize computing terminology correctly														
20: explain benefits/risks of technology reliance in society														
21: use fundamental programming elements														

*Developed in MATH-M216, M311, M303, M313, M360, M366, T336, M403, M413, M415, M447, M471. Mastered in MATH-M414, M448, M472
**Developed in MATH-M216, M311, M303, M313, M360, M447, M471. Mastered MATH-M366, M448, M472.
***Developed in MATH-M403, M413, M447. Mastered MATH-M404, M414, M448.

	INFO-I 101	INFO-I 202	INFO-I 210	INFO-I 211	INFO-I 300	INFO-I 303	INFO-I 308	INFO-I 450	INFO-I 451
1: explain the role of data collection and analysis in the development of scientific knowledge									
2: explain the self-correcting nature of science									
3: collect meaningful data from an experiment									
4: apply mathematical techniques to analyze collected data using current technology									
5: draw relevant conclusions from experimental results									
6: utilize scientific terminology correctly									
7: express the results of scientific work clearly and concisely									
8: explain the solutions to problems using correct mathematical vocabulary and mathematical notation									
9: explain similar/identical features of living systems									
10: explain biodiversity									
11: describe the cellular and molecular basis of genetics									
12: explain the relationship between the structure of substances and their physical properties and reactivity at the molecular and atomic levels									
13: explain the interaction of the forces of nature, such as electromagnetism, gravity, and nuclear forces									
14: explain the unifying principle of plate tectonics and how it relates to the origin of Earth's physical phenomena, including rocks, volcanoes, and earthquakes									
15: perform algorithmic and logical procedures									
16: interpret the results of their computations									
17: use appropriate technology									
18: formulate a hypothesis and determine its validity									
19: utilize computing terminology correctly	I		D				M		
20: explain benefits/risks of technology reliance in society		I			D	D		M	
21: use fundamental programming elements			I	D					M

IV. Assessment Plan

Academic Year	
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	Which outcomes are being assessed this academic year? (All outcomes can be assessed each year.)
Learning outcomes for Biology Learning Outcome 9: Students will explain similar/identical features of living systems Learning Outcome 10: Students will explain biodiversity Learning Outcome 11: Students will describe the cellular and molecular basis of genetics **Learning outcomes for the Physical Sciences** Learning Outcome 12: Students will explain the relationship between the structure of substances and their physical properties and reactivity at the molecular and atomic levels Learning Outcome 13: Students will explain the interaction of the forces of nature, such as electromagnetism, gravity, and nuclear forces Learning Outcome 14: Students will explain the unifying principle of plate tectonics and how it relates to the origin of Earth's physical phenomena, including rocks, volcanoes, and earthquakes **Outcome for the Mathematical Sciences** Learning Outcome 15: Students will perform algorithmic and logical procedures Learning Outcome 16: Students will interpret the results of their computations Learning Outcome 17: Students will use appropriate technology Learning Outcome 18: Students will formulate a hypothesis and determine its validity **Outcome for Informatics**	

Learning Outcome 19: Students will utilize computing terminology correctly Learning Outcome 20: Students will explain benefits/risks of technology reliance in society Learning Outcome 21: Students will use fundamental programming elements	
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 BIOL-L 105, BIOL-L 211, BIOL-L 345, BIOL-L 364, PHYS-P 416, MICR-M 320, BIOL-L 367, BIOL-L 211, ZOOL-Z 315, CHEM-C 105, CHEM-C 106, CHEM-C 210, PHYS-P 100, PHYS-P 201, PHYS-P 202, PHYS-P 221, PHYS-P 222, GEOL-G 100, GEOL-G 133, GEOL-G 326, GEOL-G 400, MATH-M216, MATH-M311, MATH-M303, MATH-M313, MATH-M360, MATH-M366, MATH-T336, MATH-M403, MATH-M413, MATH-M415, MATH-M447, MATH-M471, MATH-M414, MATH-M448, MATH-M472, MATH-M216, MATH-M311, MATH-M303, MATH-M313, MATH-M360, MATH-M447, MATH-M471, MATH-M366, MATH-M448, MATH-M472, MATH-M403, MATH-M413, MATH-M447, MATH-M404, MATH-M414, MATH-M448, INFO-I 101, INFO-I 202, INFO-I 210, INFO-I 211, INFO-I 300, INFO-I 303, INFO-I 308, INFO-I 450, and INFO-I 451. These courses provide a broad range of lower-level and upper-level BIIPH courses for the majors. The assessment will be done using final exam questions 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	Which outcomes are being assessed this academic year? (All outcomes can be assessed each year.)
Learning Outcome 1: Students will explain the role of data collection and analysis in the development of scientific knowledge Learning Outcome 2: Students will explain the self-correcting nature of science Learning Outcome 3: Students will collect meaningful data from an experiment Learning Outcome 4: Students will apply mathematical techniques to analyze collected data using current technology Learning Outcome 5: Students will draw relevant conclusions from experimental results	
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 BIOL-L 211, BIOL-L 403, CHEM-C 105, CHEM-C 106, CHEM-C 125, CHEM-C 126, PHYS-P 100, PHYS-P 201, PHYS-P 202, PHYS-P 221, PHYS-P 222, GEOL-G 100, and GEOL-G 133. These courses	

provide a broad range of lower-level and upper-level BIPH courses for the majors. The assessment will be done using final exam questions 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 2022-2023	
Student Learning Outcomes	Which outcomes are being assessed this academic year? (All outcomes can be assessed each year.)
Learning Outcome 6: Students will utilize scientific terminology correctly Learning Outcome 7: Students will express the results of scientific work clearly and concisely Learning Outcome 8: Students will explain the solutions to problems using correct mathematical vocabulary and mathematical notation	
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 BIOL-L105, BIOL-L 403, CHEM-C 125, CHEM-C 126, PHYS-P 100, PHYS-P 201, PHYS-P 202, PHYS-P 221, GEOL-G 100, and GEOL-G 133. These courses provide a broad range of lower-level and upper-level BIPH courses for the majors. The assessment will be done using final exam questions 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 2023-2024	
Student Learning	Which outcomes are being assessed this academic year? (All outcomes can be

Outcomes	assessed each year.)

Learning outcomes for Biology
Learning Outcome 9: Students will explain similar/identical features of living systems
Learning Outcome 10: Students will explain biodiversity
Learning Outcome 11: Students will describe the cellular and molecular basis of genetics

Learning outcomes for the Physical Sciences
Learning Outcome 12: Students will explain the relationship between the structure of substances and their physical properties and reactivity at the molecular and atomic levels
Learning Outcome 13: Students will explain the interaction of the forces of nature, such as electromagnetism, gravity, and nuclear forces
Learning Outcome 14: Students will explain the unifying principle of plate tectonics and how it relates to the origin of Earth's physical phenomena, including rocks, volcanoes, and earthquakes

Outcome for the Mathematical Sciences
Learning Outcome 15: Students will perform algorithmic and logical procedures
Learning Outcome 16: Students will interpret the results of their computations
Learning Outcome 17: Students will use appropriate technology
Learning Outcome 18: Students will formulate a hypothesis and determine its validity

Outcome for Informatics
Learning Outcome 19: Students will utilize computing terminology correctly
Learning Outcome 20: Students will explain benefits/risks of technology reliance in society
Learning Outcome 21: Students will use fundamental programming elements

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 BIOL-L 105, BIOL-L 211, BIOL-L 345, BIOL-L 364, PHYS-P 416, MICR-M 320, BIOL-L 367, BIOL-L 211, ZOOL-Z 315, CHEM-C 105, CHEM-C 106, CHEM-C 210, PHYS-P 100, PHYS-P 201, PHYS-P 202, PHYS-P 221, PHYS-P 222, GEOL-G 100, GEOL-G 133, GEOL-G 326, GEOL-G 400, MATH-M216, MATH-M311, MATH-M303, MATH-M313, MATH-M360, MATH-M366, MATH-T336, MATH-M403, MATH-M413, MATH-M415, MATH-M447, MATH-M471, MATH-M414, MATH-M448, MATH-M472, MATH-M216, MATH-M311, MATH-M303, MATH-M313, MATH-M360, MATH-M447, MATH-M471, MATH-M366, MATH-M448, MATH-M472, MATH-M403, MATH-M413, MATH-M447, MATH-M404, MATH-M414, MATH-M448, INFO-I 101, INFO-I 202, INFO-I 210, INFO-I 211, INFO-I 300, INFO-I 303, INFO-I 308, INFO-I 450, and INFO-I 451. These courses provide a broad range of lower-level and upper-level BIPH courses for the majors. The assessment will be done using final exam questions 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 2024-2025	
Student Learning Outcomes	Which outcomes are being assessed this academic year? (All outcomes can be assessed each year.)
Learning Outcome 1: Students will explain the role of data collection and analysis in the development of scientific knowledge Learning Outcome 2: Students will explain the self-correcting nature of science Learning Outcome 3: Students will collect meaningful data from an experiment Learning Outcome 4: Students will apply mathematical techniques to analyze collected data using current technology Learning Outcome 5: Students will draw relevant conclusions from experimental results	
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 BIOL-L 211, BIOL-L 403, CHEM-C 105, CHEM-C 106, CHEM-C 125, CHEM-C 126, PHYS-P 100, PHYS-P 201, PHYS-P 202, PHYS-P 221, PHYS-P 222, GEOL-G 100, and GEOL-G 133. These courses provide a broad range of lower-level and upper-level BIPH courses for the majors. The assessment will be done using final exam questions 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.	