

BA in BIOLOGICAL and PHYSICAL SCIENCES
ASSESSMENT PLAN for Academic Year 2016-2020

I. Mission

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. Program Goals/ Student Learning Outcomes/Components

A. The goals for attaining these objectives and their relevance to the overall campus mission are indicated below. These goals were created to prepare students for professional careers or acceptance into advanced graduate programs.

Goal #1: Students will be able to reason scientifically.

Outcome #1: Understand the nature of scientific truth

Component #1: Explain the role of data collection and analysis in the development of scientific knowledge

Component #2: Explain the self-correcting nature of science

Outcome #2: Recognize relationships among variables tested in a scientific experiment

Component #1: Collect meaningful data from an experiment

Component #2: Apply mathematical techniques to analyze collected data using current technology

Component #3: Apply statistical methods to evaluate experimental data

Component #4: Draw relevant conclusions from experimental results

Goal #2: *Students will communicate scientific ideas clearly and effectively.*

Outcome #1: Communicate in the scientific tradition

Component #1: Utilize scientific terminology correctly

Component #2: Express the results of scientific work clearly and concisely

Component #3: Explain the solutions to problems using correct mathematical vocabulary and mathematical notation

Goal #3: *Students will understand the basic principles of the biological sciences OR the physical sciences OR the mathematical sciences OR informatics.*

Outcome for Biology: Students will be able to describe the unifying principles of biology

- Component #1: Explain similar/identical features of living systems
- Component #2: Explain biodiversity
- Component #3: Describe the cellular and molecular basis of genetics

Outcome for the Physical Sciences: Students will understand phenomena that govern the physical universe

- Component #1: Explain the relationship between the structure of substances and their physical properties and reactivity at the molecular and atomic levels
- Component #2: Explain the interaction of the forces of nature, such as electromagnetism, gravity, and nuclear forces
- Component #3: 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: Students will be able to formulate and solve problems mathematically

- Component #1: Perform algorithmic and logical procedures
- Component #2: Interpret the results of their computations
- Component #3: Use appropriate technology
- Component #4: Formulate a hypothesis and determine its validity

Outcome for Informatics: Students will be able to describe the roles of technology to address computational needs in the modern world

- Component #1: Utilize computing terminology correctly
- Component #2: Explain benefits/risks of technology reliance in society
- Component #3: Use fundamental programming elements

III. Curriculum map

Goal	Outcome	Component	Courses in which Outcome is INTRODUCED	Courses in which Outcome is EXPANDED	Courses in which Outcome is REINFORCED	
#1: Students will be able to reason scientifically	#1. Understand the nature of scientific truth	#1. Explain the role of data collection and analysis in the development of scientific knowledge	BIOL-L 211 CHEM-C 105 GEOL-G 100 GEOL-G 133 PHYS-P 100 PHYS-P 201 PHYS-P 221	CHEM-C 106 PHYS-P 202 PHYS-P 222	BIOL-L403	
		#2. Explain the self-correcting nature of science	BIOL-L 211 CHEM-C 105 GEOL-G 100 GEOL-G 133	CHEM-C 106	BIOL-L 403	
	#2. Recognize relationships among variables tested in a scientific experiment	#1. Collect meaningful data from an experiment	CHEM-C 125 PHYS-P 100 PHYS-P 201 PHYS-P 221	CHEM-C 126 PHYS-P 202 PHYS-P 222		
		#2. Apply mathematical techniques to analyze collected data using current technology	CHEM-C 211			
		#3. Apply statistical methods to evaluate experimental data	CHEM-C 211			
		#4. Draw relevant conclusions from experimental results	CHEM-C 125	CHEM-C 126		
	#2: Students will communicate scientific ideas clearly and effectively.	#1. Communicate in the scientific tradition	#1: Utilize scientific terminology correctly	BIOL- L 105 (Lecture or Lab) CHEM-C 125 GEOL-G 100 GEOL-G 133 PHYS-P 201 (Lab) PHYS-P 221 (Lab)	CHEM-C 126 GEOL-T 326 GEOL-G 400 PHYS-P 202 (LAB) PHYS-P222 (Lab)	BIOL-L 403
			#2: Express the results of scientific work clearly and concisely	BIOL- L 105 (Lab) or BIOL-L 213 (lab) CHEM-C 125	CHEM-C 126 PHYS-P 221 (Lab) PHYS-P 222 (LAB)	BIOL-L 403

			PHYS-P 201 (Lab) PHYS-P 221 (Lab)		
		#3: Explain the solutions to problems using correct mathematical vocabulary and mathematical notation	MATH-M 215-216 MATH-M 311 MATH-M 303	MATH-M 360-366	
#3: Students will understand the basic principles of the biological sciences OR the physical sciences OR the mathematical sciences.	Biological Sciences: Describe the unifying principles of biology	#1. Explain similar/identical features of living systems	BIOL-L 105; ZOO-L-Z 315	BIOL-L 345; PHSL-P 416	
		#2. Explain biodiversity	MICR-M 310		
		#3. Describe the cellular and molecular basis of genetics	BIOL-L 211	BIOL-L 364	
	Physical Sciences: Understand phenomena that govern the physical universe	#1. Explain the relationship between the structure of substances and their physical properties and reactivity at the molecular and atomic levels	CHEM-C 105	CHEM-C 106, 210	
		#2. Explain the interaction of the forces of nature, such as electromagnetism, gravity, and nuclear forces	PHYS-P 100	PHYS-P 201/202 PHYS-P221/222	
		#3. Explain the unifying principle of plate tectonics and how it relates to the origin of Earth's physical phenomena, including rocks, volcanoes, and earthquakes	GEOL-G 100 GEOL-G 133	GEOL-T326 GEOL-G400	
	Mathematical Sciences: Formulate and solve problems mathematically	#1. Perform algorithmic and logical procedures	MATH-M 215	MATH-M216, M311, M303, M313, M360, M366, T336, M403, M413, M415, M447, M471	MATH-M414, M448, M472
		#2. Interpret the results of their computations			
		#3. Use appropriate technology	MATH-M215	MATH-M216, M311, M303, M313, M360, M447, M471	MATH-M366, M448, M472
		#4. Formulate an hypothesis and	MATH-M303,	MATH-M403, M413,	MATH-M404,

	determine its validity	T336	M447	M414, M448
Informatics: Describe the roles of technology to address computational needs in the modern world	#1. Utilize computing terminology correctly	INFO-I101	INFO-I210	INFO-I308
	#2. Explain benefits/ risks of technology reliance in society	INFO-I202	INFO-I300 INFO-I303	INFO-I450
	#3. Use fundamental programming elements	INFO-I210	INFO-I211	INFO-I451

IV. Assessment of student learning activities planned for 2016 – 2020

2016-2017: Goal 3 (understand basic principles)

2017-2018: Goal 1 (understand the nature of scientific truth)

2018-2019: Goal 2 (communicate in the scientific tradition)

2019-2020: Goal 3 (understand basic principles)

Faculty involved with BIPH will meet annually to review the current plan and to decide on the specific outcomes and components to be assessed.

V. Ongoing Assessment

Recently, the Earth and Sustainability Sciences track has been created within the BIPH degree. If a significant number of BIPH students end up in this track, our assessment outcomes and components may need to be revised to better reflect the specific courses these students enroll in. We also anticipate the creation of new courses that would also be a part of this track that will need to be integrated into this plan.