Alignment of General Biology 1 (BIOL 1050) Student Learning Objectives with the BioCore (Brownwell et al. 20141)

**Purpose of Course**
The purpose of the introductory series is twofold: (1) to introduce students to the breadth of the biological sciences and (2) to help beginning biology majors master the fundamental facts and theories needed for success in subsequent courses.

This course is the first in the two-course series and will focus on cellular and molecular biology, genetics, and microevolution. The learning objectives will be met through a combination of Lecture (LE) & Lab (LA) experiences. **A grade of C- or better is required to move forward into General Biology 2 (BIOL 1150).**

**Learning Objectives**
Students will be able to:

1. Describe the properties that unite the three domains of living things. (LE)
2. Identify relationships between structure and function at all levels of biological study. (LE, LA)
3. Describe the major groups of biological macromolecules and explain their importance of each to cellular structures and functions. (LE)
4. Identify structures of prokaryotic and eukaryotic cells and explain the functions they perform. (LE, LA)
5. Describe how the cell integrates into the hierarchical organization of living systems. (LE)
6. Explain how and why cells communicate to coordinate their activities. (LE)
7. Explain how energy and materials flow within and between cells, and between cells and the environment. (LE, LA)
8. Identify the processes by which the cell obtains and produces needed resources. (LE, LA)
9. Explain the stages in the cell’s life cycle in single celled and multicellular organisms, including growth, cell reproduction, and apoptosis. (LE, LA)
10. Describe the process by which cells pass on genetic information to their offspring and explain how sexual reproduction results in genetic diversity. (LE, LA)
11. Describe how genes encode information and explain how this results in the structure and function of organisms. (LE)
12. Identify the processes that result in changes in genomes, resulting in unique individuals, populations and species. (LE, LA)
13. Explain the scientific method and describe specific techniques used to scientifically study living things. (LE, LA)

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Table 1. Alignment of Student Learning Objectives with the BioCore proposed by Brownwell et al. (2014).

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<th>THEMES</th>
<th>SUBDISCIPLINES</th>
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<td>Evolution</td>
<td>All living organisms share a common ancestor. Species evolve over time, and new species can arise, whereas allele frequencies change due to mutation, natural selection, gene flow, and genetic drift.</td>
<td>Molecular/Cellular/Developmental: 9, 12, 12, 12; Physiology: 12; Ecology/Evolution: 1, 12</td>
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<td>Information Flow</td>
<td>Organisms inherit genetic and epigenetic information that influences location, timing, and intensity of gene expression. Cells/organisms have multiple mechanisms to perceive and respond to changing environmental conditions.</td>
<td>Molecular/Cellular/Developmental: 6, 11, 12, 12; Physiology: 6, 11, 12, 12; Ecology/Evolution: 9, 10, 11</td>
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<td>Structure/Function</td>
<td>Biological structures exist at all levels of organization, from molecules to ecosystems. A structure's physical and chemical characteristics influence its interactions with other structures, and therefore its function. Natural selection leads to the evolution of structures that tend to increase fitness within the context of evolutionary, developmental, and environmental constraints.</td>
<td>Molecular/Cellular/Developmental: 2, 3, 4, 4; Physiology: 2, 4, 5, 5; Ecology/Evolution: 2, 3, 3</td>
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<td>Transformations of Energy &amp; Matter</td>
<td>Energy captured by primary producers is necessary to support the maintenance, growth, and reproduction of all organisms. Natural selection leads to the evolution of efficient use of resources within constraints.</td>
<td>Molecular/Cellular/Developmental: 7, 8, 7, 7; Physiology: 7, 8, 7, 7; Ecology/Evolution: 7, 8, 7, 7</td>
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<td>Systems</td>
<td>Biological molecules, genes, cells, tissues, and organs, individuals interact to form complex networks. A change in one component of the network can affect many other components. Organisms have complex systems that integrate internal and external information, incorporate feedback control, and allow them to respond to changes in the environment.</td>
<td>Molecular/Cellular/Developmental: 5, 6, 9, 11, 12; Physiology: 5, 6, 7, 8, 9, 11, 12; Ecology/Evolution: 7, 8, 7, 7</td>
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Molecules (smaller & faster) ---&gt; Ecosystems (larger & slower) Biological Scale