

Why align our Learning outcomes with Vision and Change? Note: Many of our outcomes already align with V&C.

Vision and change is widely supported: In 2011 [Vision and Change in Undergraduate Biology](#) initiative was created through a partnership between the National Science Foundation (NSF), the Howard Hughes Medical Institute (HHMI), the National Institutes of Health (NIH) and the American Association for the Advancement of Science (AAAS). Current partners and supporters also include the United States Department of Agriculture.

Vision and Change has gained traction: In 2012 a group of program officers from the National Science Foundation (NSF), the Howard Hughes Medical Institute (HHMI), and the National Institute for General Medical Sciences (NIGMS/NIH) launched the Partnership for Undergraduate Life Science Education (PULSE) to stimulate department-level implementation of Vision and Change in Undergraduate Biology Education. Today there are 1,649 members of the PULSE Community representing 779 home institutions or organizations, including the University of Oregon. In addition the Vision and Change report has been cited by over 100 publications on Google Scholar.

Verified assessment tools based on V&C are available: Many institutions are aligned with V&C so many assessment practices have been, and will be, developed in the context of V&C. Aligning with V&C will allow us to make use of these practices and to make direct comparisons between our program and other programs that are aligned with V&C.

Current UO BI Learning outcomes

- UO 1.** A broad-based knowledge of biology at multiple levels; an understanding of levels of biological organization, from molecules to ecosystems.
- UO 2.** An awareness of biological diversity and an understanding that all living organisms are genetically-related; a result of the ongoing process of biological evolution.
- UO 3.** Competency in reading, understanding, and critically evaluating scientific information across major areas of the curriculum (cellular/ molecular, systems/organisms, ecology/evolution).
- UO 4.** An understanding of the process and application of scientific inquiry; the ability to develop well-reasoned experimental hypotheses and design experiments by which to test them.
- UO 5.** An ability to apply mathematical and statistical approaches s to understanding biological information; an ability to interpret graphical representations of biological information.
- UO 6.** An ability to communicate scientific ideas clearly, orally and in writing, in forms appropriate to both general and professional audiences.
- UO 7.** An understanding of the importance of biological science in a modern society.

Vision and change core competencies

- M1. Ability to apply the process of science:** Biology is evidence based and grounded in the formal practices of observation, experimentation, and hypothesis testing.
- M2. Ability to use quantitative reasoning:** Biology relies on applications of quantitative analysis and mathematical reasoning.
- M3. Ability to use modeling and simulation:** Biology focuses on the study of complex systems.
- M4. Ability to tap into the interdisciplinary nature of science:** Biology is an interdisciplinary science.
- M5. Ability to communicate and collaborate with other disciplines:** Biology is a collaborative scientific discipline.
- M6. Ability to understand the relationship between science and society:** Biology is conducted in a societal context.

Vision and change core concepts

- C1. Evolution:** The diversity of life evolved over time by processes of mutation, selection, and genetic change.
 - C2. Structure and function:** Basic units of structure define the function of all living things.
 - C3. Information flow, exchange, and storage:** The growth and behavior of organisms are activated through the expression of genetic information in context.
 - C4. Pathways and transformations of energy and matter:** Biological systems grow and change by processes based on chemical transformation pathways and are governed by the laws of thermodynamics.
 - C5. Systems:** Living systems are interconnected and interacting.
- Comparisons between UO and V&C. Strong similarity are in bold

UO	V&C Core Competencies	V&C Core Concepts
UO1 (similar to UO3)	M4	C2, (C5?)
UO2		C1
UO3	(M4?)	
UO4	M1	
UO5	M2, M3	
UO6	M5	
UO7	M6	

V&C concepts and competencies not emphasized in our learning outcomes: C2-5 & M4

Proposed Learning Outcomes (aligned with V&C):

- 1. An understanding of the process and application of scientific inquiry; the ability to develop well-reasoned hypotheses and to design experiments by which to test them.** (UO 4) (M1. Ability to apply the process of science)
- 2. An ability to apply mathematical and statistical approaches to understanding biological information; an ability to interpret graphical representations of biological information.** (UO5) (M2. Ability to use quantitative reasoning)
- 3. An ability to use modeling and simulation to study biological systems** (M3. Ability to use modeling and simulation)
- 4. A broad-based knowledge of biology at multiple levels and in interdisciplinary contexts; competency in reading, understanding, and critically evaluating scientific information across major areas of the curriculum, from molecules to ecosystems.** (UO1, UO3) (M4. Ability to tap into the interdisciplinary nature of science)

Fundamental Concepts:

- **Evolution and biological diversity:** all living organisms are genetically-related; the diversity of life evolved over time by processes of mutation, selection, and genetic change. (UO2) (C1)
- **Structure and function:** Basic units of structure give rise to the function of all living things. (C2)
- **Information flow, exchange, and storage:** Properties of organisms emerge from the flow, exchange, expression, and storage of genetic information. (C3)
- **Pathways and transformations of energy and matter:** Biological systems grow and change by processes based on chemical transformation pathways and are governed by the laws of thermodynamics. (C4)
- **Systems:** Living systems are interconnected and interacting. (C5)

- 5. An ability to communicate clearly, orally and in writing, with both general audiences and professional audiences in relevant disciplines.** (UO6) (M5. Ability to communicate and collaborate with other disciplines)
- 6. Ability to understand the relationship between science and modern society as well as the potential impact of scientific discovery on the future.** (UO7)(M6. Ability to understand the relationship between science and society)