

Biology 11

Foundational Outcomes

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Biology 11

EECD has made suggestions for prioritizing outcomes to assist teachers as they support student learning. Teachers will need to make their professional decisions based on the needs of their students.

The Foundational Outcomes identified in this document represent outcomes determined to be relevant for future learning in the discipline. Decisions about foundational outcomes were made in consultation with teachers, science specialists and post-secondary institution expectations. The foundational outcomes are meant to guide teachers in making decisions about creating learning experiences that will prepare and engage their learners in a responsive way. However, a teacher's professional judgment remains the most crucial factor for responding effectively to the needs of learners.

It might be relevant for teachers to review or to seek out learning outcomes from an earlier curriculum or grade level in order to support learners moving forward with current curriculum. Sometimes, however, current curricular learnings do not directly rely on learning from the previous year and current curriculum can be engaged in without additional review.

The learning environment (face-to-face, blended, online) will continue to be an important factor that will impact the types of learning experiences with which learners are able to engage. While learning science in a hands-on, experimental way is preferred, should laboratory experiments not be possible due to public health concerns, teachers are encouraged to offer online experiment simulations, to record scientific phenomena to discuss, notice, observe and unpack with learners, to support simple, safe experiments that could be done at home, to provide authentic data that can be analysed etc...

Integrated, project-based learning and inquiry-based learning (especially in areas that connect STSE) allow for learner choice and flexible pacing which is particularly effective for students to not only learn new concepts but also for demonstrating their learning.

It is suggested that the focus for science in grades 9-12 be on using the foundational outcomes to focus on foundational understandings for future learning, encouraging cross-cutting scientific themes and application of learning. Weighting for course modules should be reflective of the amount of time spent exploring the outcomes in the module.

Unit: Matter and Energy for Life

Subtopic: INTERACTION OF CELL STRUCTURES

- compare and contrast different types of prokaryotic and eukaryotic cells (314-7)
- describe how organelles manage various cell processes (314-8)

Subtopic: PHOTOSYNTHESIS AND RESPIRATION

- compare and contrast matter and energy transformations associated with the processes of photosynthesis and aerobic respiration (314-9)

Unit: Biodiversity

Subtopic: CLASSIFYING LIVING THINGS

- describe and apply classification systems and nomenclatures used in the biological sciences (214-1)

Subtopic: DIVERSITY AMONG LIVING THINGS

- describe the anatomy and physiology of a representative organism from each kingdom, including a representative virus (316-6)
- analyze and explain the life cycle of a representative organism from each kingdom, including a representative virus (313-1)

**It could be suggested that teachers or students choose a few kingdoms to focus on for deeper exploration and comparisons rather than including all of them for the two outcomes above.*

Unit: Maintaining Dynamic Equilibrium I

Subtopic: HOMEOSTATIS

- explain, with specific examples, how behaviours such as tropisms, instinct, and learned, help to maintain homeostasis and identify multiple perspectives that influence a decision/issue (215-4, 317-8)

Subtopic: BODY SYSTEMS

Biology 11 requires that a minimum of two (2) of the following five body systems be investigated in detail—circulatory, respiratory, digestive, excretory, and immune systems.

- identify and describe the role of chemicals, including elements, compounds, biochemicals, and water on the structure and function of various body systems (314-1, 314-2, 314-3)
- explain how different plant and animal systems maintain homeostasis (317-1)
- identify and predict the impact of viruses, diseases, and environmental factors on the homeostasis of an organism and propose alternate solutions (317-4, 317-6, 214-15)

Unit: Interactions Among Living Things

Subtopic: BIOMES

- compare and interpret patterns of North America's biomes with another continent in terms of climate, vegetation, physical geography, and location (214-5, 318-7)

Subtopic: POPULATION DYNAMICS

- synthesize information from multiple sources to describe and explain factors that influence population growth and interactions within and between populations (215-3, 318-8, 319-9)

Note: *If teachers need to eliminate a unit, the unit that has least impact on future concept-building in the study of Biology is the Interactions Among Living Things unit.*

In preparation for Biology 12, teachers should ensure students have a solid grasp of cell transport prior to engaging with the Maintaining Dynamic Equilibrium II unit in Biology 12.