

Biology 12

Foundational Outcomes

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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: Maintaining Dynamic Equilibrium II

Subtopic: NERVOUS SYSTEM: NEURONS AND STRUCTURE

- explain how different plant and animal systems maintain homeostasis (317-1)
- design an experiment to investigate and collect data on aspects of the nervous system and identify specific variables involved (212-6)
- analyze the nervous system and compile and organize data to interpret its structure and dynamics (116-7, 213-5)

Subtopic: INFLUENCES ON THE NERVOUS SYSTEM

- evaluate the impact of viral, bacterial, genetic, and environmental diseases on an organism's homeostasis (317-4)
- analyze how and why technologies and drugs developed and improved over time can affect homeostasis (115-5, 317-7)

Subtopic: ENDOCRINE SYSTEM: MAINTAINING HOMEOSTASIS

- identify and describe the structure and function of important biochemical compounds, including protein and steroid hormones (314-3)

Subtopic: ENDOCRINE SYSTEM: FEEDBACK MECHANISMS

- analyze homeostatic phenomena to identify the feedback mechanisms involved (317-2)

Unit: Reproduction and Development

Subtopic: CELL DIVISION

- describe in detail mitosis and meiosis (313-2)

Subtopic: REPRODUCTIVE SYSTEMS: REGULATION AND TECHNOLOGIES

- analyze and describe the structure and function of female and male mammalian reproductive systems (313-3)
- identify and apply criteria, including potential applications, chemicals, and diseases, to explain the human reproductive cycles (214-9, 214-18, 313-4)

Unit: Genetic Continuity

Subtopic: MOLECULAR LEVEL

- identify and describe the roles of chromosomes in the transmission of hereditary information from one cell to another (315-2)
- describe and predict the effects of genetic mutations on a cell's information, including protein synthesis, phenotypes, and heredity (315-6, 315-7)

Subtopic: MENDELIAN GENETICS

- using Mendelian genetics, state a prediction, perform, and interpret patterns and trends in genetic data of monohybrid and dihybrid crosses and explain how the data supports or refutes the situation (212-4, 214-5, 315-3, 214-12)

Subtopic: IMPLICATIONS

- analyze the risks and benefits to society and the environment and construct arguments concerning the use of genetic engineering, using examples and evidence from various perspectives (118-2, 315- 9,118-6)

Unit: Evolution, Change, and Diversity

Subtopic: EVIDENCE AND MECHANISMS

- describe and evaluate scientific peer review and evidence that have changed evolutionary concepts and feeds the debates on gradualism and punctuated equilibrium (114-5, 316-1, 316-2)

Subtopic: IMPLICATIONS

- outline evidence and arguments pertaining to the origin, development, and diversity of living organisms on Earth and identify new questions that arise from what was learned (316-4, 214-17)