

# Biology 12

## General Curriculum Outcomes

### STSE

1. Students will develop an understanding of the nature of science and technology, of the relationships between science and technology, and of the social and environmental contexts of science and technology.

### Skills

2. Students will develop the skills required for scientific and technological inquiry, for solving problems, for communicating scientific ideas and results, for working collaboratively, and for making informed decisions.

### Knowledge

3. Students will construct knowledge and understandings of concepts in life science, physical science, and Earth and space science, and apply these understandings to interpret, integrate, and extend their knowledge.

### Attitudes

4. Students will be encouraged to develop attitudes that support the responsible acquisition and application of scientific and technological knowledge to the mutual benefit of self, society, and the environment.

## Specific Curriculum Outcomes

Students will be expected to

### Maintaining Dynamic Equilibrium II (20%) (Advanced, 16%)

#### **NERVOUS SYSTEM: NEURONS AND STRUCTURE**

- explain how different plant and animal systems maintain homeostasis (317-1)
- identify the role of some compounds, such as water, glucose, and ATP, commonly found in living systems (314-2)
- 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)

**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)
- evaluate and describe examples of treatments and technologies for visual and auditory functions (116-4, 317-5)

**ENDOCRINE SYSTEM: MAINTAINING HOMEOSTASIS**

- explain how different plant and animal systems maintain homeostasis (317-1)
- identify and describe the structure and function of important biochemical compounds, including protein and steroid hormones (314-3)
- explain the critical role of enzymes in cellular metabolism (314-4)
- design and do an experiment, identify variables, and compile and organize data on selected aspects of the endocrine system (212-6, 213-5)

**ENDOCRINE SYSTEM: FEEDBACK MECHANISMS**

- analyze homeostatic phenomena to identify the feedback mechanisms involved (317-2)
- analyze contributions, including Canadian, to science and technology and how these have improved over time (117-11, 115-5)

**Reproduction and Development (24%) (Advanced, 19%)****CELL DIVISION**

- design, perform, compile data, and evaluate experiments on plant materials, using instruments effectively, controlling major variables, and selecting appropriate processes (212-3, 213-3, 212-8, 213-5)
- describe in detail mitosis and meiosis (313-2)
- investigate, analyze, and communicate genetic techniques, giving examples from organized data, that use technologies that have been developed based on cells (116-2, 116-3, 116-7, 213-5, 215-2)
- evaluate the physiological and ethical consequences of medical treatments such as radiation therapy and chemotherapy (317-5)

**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)
- select and integrate information from various sources and explain current reproductive technologies for plants and animals (231-7, 313-5)
- distinguish between scientific questions and technological problems to evaluate the use of reproductive technologies for humans (115-1, 313-6)

**EMBRYONIC DIFFERENTIATION AND DEVELOPMENT**

- explain the human reproductive cycles, including analyzing examples of the effects of technology and science on reproduction (313-4, 116-2)

**Genetic Continuity (40%) (Advanced, 35%)****MOLECULAR LEVEL**

- summarize the discoveries, including the role of evidence, that led to the modern concept of the gene (315-1, 114-2)
- identify and describe the roles of chromosomes in the transmission of hereditary information from one cell to another (315-2)
- explain how the current model of DNA replication, the structure of DNA and RNA, and protein synthesis revolutionized thinking in scientific communities (315-4, 315-5, 115-3)
- describe and predict the effects of genetic mutations on a cell's information, including protein synthesis, phenotypes, and heredity (315-6, 315-7)

**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)

**IMPLICATIONS**

- explain the circumstances that lead to genetic diseases (315-8)
- 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)
- analyze, describe, and evaluate genetics-based technology development, design, and solutions (116-4, 116-6)
- explain and analyze, from a variety of perspectives, the risks and benefits of the influence of the Human Genome Project (315-10, 117-2)
- investigate, perform, and defend a position or course of action on genetic modification, integrating various sources and science- and technology-based careers (215-5, 117-7, 213-7)

**Evolution, Change, and Diversity (16%) (Advanced, 10%)****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)
- explain and analyze the roles of evidence, theories, and paradigms as these are tested, and subsequently restricted, revised, or replaced (114-2, 115-7, 116-2)

**IMPLICATIONS**

- identify questions to investigate, collect information, and construct arguments to support the development and diversity of living organisms, using examples and evidence (212-1, 213-6, 118-6)
- 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)