

Northwestern High School IB Biology

(adopted by Skyline High School)

Unit List

IB Biology HL is taught over two years. At Northwestern High School, we have a quarter / semester system, so the class units are broken up by units. The unit lengths are estimates only. Please note: **this document represents a GOAL.**

0. Learning and Memory

A. **IB topic(s):** 6.5

B. **Essential Idea(s):** Learning is a biological process that can be enhanced with repetition.

1. Cell Theory

a. **IB topic(s):** 1.1 and 1.5

b. **Essential Idea(s):** Living organisms are composed of cells that share common characteristics.

2. Microscopy

a. **IB topic(s):** 1.1 and 1.2

b. **Essential Idea(s):** Microscopes are an important tool used in the study of cellular biology.

3. Prokaryotic Cells

a. **IB topic(s):** 1.2, 3.2 and 6.3

b. **Essential Idea(s):** Prokaryotes have a much simpler cell structure than eukaryotes

4. Eukaryotic Cells

a. **IB topic(s):** 1.2, 1.4 and 1.5

b. **Essential Idea(s):** Eukaryotes have a much more complex cell structure than prokaryotes

5. Stem Cells & Differentiation

a. **IB topic(s):** 1.1 and 3.5

b. **Essential Idea(s):** Stem cells are capable of dividing and differentiating along different pathways.

6. Cell Division & Cancer

a. **IB topic(s):** 1.6, 3.2, 6.4, 7.1, D.1 and D.6

b. **Essential Idea(s):** Cell division involves interphase, mitosis and cytokinesis. Control of the cell cycle is essential and must be controlled

7. Cell Membrane Structure

- a. **IB topic(s):** 1.3
- b. **Essential Idea(s):** The structure of biological membranes makes them fluid and dynamic

8. Cell Membrane Function

- a. **IB topic(s):** 1.1 and 1.4
- b. **Essential Idea(s):** Membranes control the composition of cells by active and passive transport

9. Water

- a. **IB topic(s):** 2.2
- b. **Essential Idea(s):** Water is the medium of life.

10. Introduction to Molecular Biology

- a. **IB topic(s):** 2.1 and D.1
- b. **Essential Idea(s):** Compounds of carbon, hydrogen and oxygen are used to supply and store energy.

11. Carbohydrates and Lipids

- a. **IB topic(s):** 2.1, 2.3 and D.1
- b. **Essential Idea(s):** Compounds of carbon, hydrogen and oxygen are used to supply and store energy.

12. Nucleic Acids

- a. **IB topic(s):** 2.6, 3.5 and 7.1
- b. **Essential Idea(s):** The structure of DNA allows efficient storage of genetic information.

13. DNA Replication

- a. **IB topic(s):** 2.7, 3.5 and 7.1
- b. **Essential Idea(s):** The structure of DNA is ideally suited to its replication. Biologists have developed techniques for artificial manipulation of DNA, cells and organisms.

14. Genes & Genomes

- a. **IB topic(s):** 3.1, 3.2, 3.4, 7.1 and 7.3
- b. **Essential Idea(s):** Every living organism inherits a blueprint for life from its parents / Chromosomes carry genes in a linear sequence that is shared by members of a species.

15. Chromosomes & Meiosis

- a. **IB topic(s):** 3.2, 3.3, 3.4, 6.6, 10.1, 10.2
- b. **Essential Idea(s):** Chromosomes carry genes in a linear sequence that is shared by members of a species. Alleles segregate during meiosis allowing new combinations to be formed by the fusion of gametes / Meiosis leads to independent assortment of chromosomes and unique composition of alleles in daughter cells.

16. Genetic Inheritance

- a. **IB topic(s):** 3.4, 10.1, 10.2 and D.1
- b. **Essential Idea(s):** The inheritance of genes follows patterns. Genes may be linked or unlinked and are inherited accordingly.

17. More Complex Genetics

- a. **IB topic(s):** 10.1 and 10.2
- b. **Essential Idea(s):** Genes may be linked or unlinked and are inherited accordingly.

18. Natural Selection

- a. **IB topic(s):** 5.1, 5.2, 10.2, 10.3
- b. **Essential Idea(s):** The diversity of life has evolved and continues to evolve by natural selection.

19. Evidence for Evolution

- a. **IB topic(s):** 5.1, 5.2, and 6.3
- b. **Essential Idea(s):** There is overwhelming evidence for the evolution of life on Earth.

20. Speciation

- a. **IB topic(s):** 4.1, 5.1 and 10.3
- b. **Essential Idea(s):** Gene pools change over time.

21. Classification & Biodiversity

- a. **IB topic(s):** 5.3
- b. **Essential Idea(s):** Species are named and classified using an internationally agreed system. The identification of organisms can be aided with the use of a dichotomous key.

22. Cladistics

- a. **IB topic(s):** 5.3, 5.4, D.1
- b. **Essential Idea(s):** The ancestry of groups of species can be deduced by comparing their base or amino acid sequences.

SUMMER ASSIGNMENT – ECOLOGY

Communities and Ecosystems

IB topic(s): 4.1 and 9.4

Essential Idea(s): The continued survival of living organisms, including humans, depends on sustainable communities.

Energy Flow through Ecosystems

IB topic(s): 4.1 and 4.2

Essential Idea(s): Ecosystems require a continuous supply of energy to fuel life processes and to replace energy lost as heat.

Nutrient Cycles

IB topic(s): 4.1 and 4.3

Essential Idea(s): Continued availability of carbon in ecosystems depends on carbon cycling.

Climate Change

IB topic(s): 4.4

Essential Idea(s): Concentration of gases in the atmosphere affect climates experienced at the Earth's surface.

23. Transcription & Gene Expression

a. **IB topic(s):** 2.7, 7.1 and 7.2

b. **Essential Idea(s):** Information stored as a code in DNA is copied onto mRNA. Cells control when and where specific genes are expressed.

24. Translation

a. **IB topic(s):** 2.7 and 7.3

b. **Essential Idea(s):** Information transferred from DNA to mRNA is translated into an amino acid sequence.

25. Genetic Engineering

a. **IB topic(s):** 2.7 and 3.5

b. **Essential Idea(s):** Biologists have developed techniques for artificial manipulation of DNA, cells and organisms.

26. Protein Structure and Function

a. **IB topic(s):** 2.1, 2.4, 7.3 and D.1

b. **Essential Idea(s):** Proteins have a very wide range of functions in living organisms.

27. Enzymes & Metabolism

- a. **IB topic(s):** 2.1, 2.5, 2.7, 7.3, and 8.1
- b. **Essential Idea(s):** Information transferred from DNA to mRNA is translated into an amino acid sequence. Living Organisms control their composition by complex web of chemical reactions. Metabolic reactions are regulated in response to the cell's needs. Enzymes control the metabolism of the cell.

28. Respiration

- a. **IB topic(s):** 2.8 and 8.2
- b. **Essential Idea(s):** Cell respiration supplies energy for the functions of life. Energy is converted to a usable form in cell respiration.

29. Photosynthesis

- a. **IB topic(s):** 2.9 and 8.3
- b. **Essential Idea(s):** Specific wavelengths of light activate photosynthetic pigments. Photosynthesis uses the energy in sunlight to produce the chemical energy needed for life / Light energy is converted into chemical energy.

30. Xylem Structure & Function

- a. **IB topic(s):** 9.1 and 9.2
- b. **Essential Idea(s):** Structure and function are correlated in the xylem in plants.

31. Phloem Structure and Function

- a. **IB topic(s):** 9.2
- b. **Essential Idea(s):** Structure and function are correlated in the phloem in plants.

32. Plant Response and Growth

- a. **IB topic(s):** 9.3
- b. **Essential Idea(s):** Plants adapt their growth to environmental conditions.

33. Angiosperm Reproduction

- a. **IB topic(s):** 9.4
- b. **Essential Idea(s):** Reproduction in flowering plants is influenced by the biotic and abiotic environments.

Immunity

IB topic(s): 6.3 and 11.1

Essential Idea(s): The human body has structures and processes that resist the continuous threat of invasion by pathogens. Immunity is based on recognition of self and destruction of foreign material.

Hormones and Homeostasis

IB topic(s): 6.6. D.1 and D.5

Essential Idea(s): Hormones are used when signals need to be widely distributed to maintain homeostasis.

Digestion

IB topic(s): 6.1 and D.2

Essential Idea(s): The structure of the digestive system allows it to move, digest, absorb and egest food.

Liver Structure & Function

IB topic(s): D.3

Essential Idea(s): The chemical composition of the blood is regulated by the liver.

Kidney & Osmoregulation

IB topic(s): 11.3

Essential Idea(s): All animals excrete nitrogenous waste products and some animals also balance water and solute concentrations.

Nerves

IB topic(s): 1.4 and 6.5

Essential Idea(s): Neurons transmit the message, synapses modulate it.

Heart Structure & Function / Circulation

IB topic(s): 6.2, 6.3, D.1 and D.4

Essential Idea(s): Internal and external factors influence heart function. The blood system continuously transports substances to cells & collects waste products.

Lungs / Respiration

IB topic(s): 6.4 and D.6

Essential Idea(s): The lungs are actively ventilated to ensure that gas exchange can occur passively. Red blood cells are vital in the transport of respiratory gases.

Muscles and Movement

IB topic(s): 11.2

Essential Idea(s): The roles of musculoskeletal system are movement, support and protection.

Reproduction

IB topic(s): 6.6. 11.4 and D.5

Essential Idea(s): Hormones influence human male and female reproduction. Pregnancy and birth are regulated by interactions between maternal and fetal systems