

IB Biology HL 1-2

Preparation for IB Bio HL 3-4

What Did We Cover Last Year?

1. Some statistics, including significant figures, uncertainty propagation, standard deviation, and t-test. This includes knowing how to use a calculator to calculate standard deviation and t-tests and how to interpret them.
2. Cells and Membranes (1.1-1.4 in the text). Some cell theory, structure of cells (prokaryote, eukaryote, plants, and animals). Models of plasma membranes. Structure of plasma membranes. Transport across membranes (endocytosis, exocytosis, vesicles, simple diffusion, facilitated diffusion, osmosis, active transport).
3. Biochemistry (2.1-2.4, 2.6). Structure of water and properties of water (cohesive, adhesive, thermal, solvent). Structure and function of amino acids, sugars, fats, and nucleic acids. Condensation synthesis to link monomers into polymers. Health risks of different types of fats.
4. Mitosis and meiosis (1.6, 3.3, 10.1). Be able to name and describe each of the phases of mitosis and meiosis and be able to identify the phases in diagrams. Stages of crossing over and the results.
5. Genes and Genetics (3.1-3.2, 3.4, 10.2). Structure of genes and chromosomes. Genetic crosses, multiplication rule, pedigrees, sex-linked genes, dihybrid crosses and Punnett grids, chi-squared, linked genes, recombinants
6. Replication, Transcription, and Translation (2.7,7.1,7.2,7.3): DNA structure, Hershey-Chase experiment, process of DNA replication, including names and functions of enzymes. Process of transcription. Importance of controlling transcription of genes (nucleosomes, genetic tags, epigenetics). Process of translation, including initiation, elongation, and termination.
7. Enzymes (2.5 and 8.1)
8. Biotechnology (3.5 and some of 1.1). Stem cells: types and what they do. Polymerase chain reaction, gel electrophoresis, DNA fingerprinting, genetic modification (how to do it and ethics, including pros and cons), cloning.
9. Plants (9.1-9.4). Transport in xylem (transpiration, xerophytes, halophytes, young stem structure, use of potometers to measure transpiration). Transport in phloem (steps of the process of translocation and using aphid stylets to measure rates of translocation). Plant growth from meristems, including apical dominance, the impact of auxin, phototropism, gravitropism, and stem cuttings. Structure and function of animal-pollinated flowers. Process of pollination, fertilization, and seed dispersal. Seed germination, including the role of gibberellin and structure of a seed.

What was NOT covered that we usually cover? Cell Respiration and Photosynthesis.

What will we cover this year in IB Bio HL 3-4?

1. Ecology (4.1-4.4). I am also going to give you work to do with Ecology over the summer. Generally we start the year with Ecology, and by having you do some work over the summer, we will be able to get through Ecology more quickly than normal.
2. Evolution (5.1,5.2, and 10.3). Evidence for evolution, principles of natural selection, examples of natural selection. Population genetics and some numerical evaluation of allele frequencies as it relates to evolution.
3. Biodiversity (5.3-5.4). Biodiversity when it comes to animals and plants. Characteristics of different animal and plant groups. Methods of classifying organisms. Cladograms and how to make them.

4. Digestion (6.1). Anatomy of the human digestive system, enzymes, and absorption.
5. Circulation and Respiration (6.2, 6.4). Structure and function of blood vessels. Structure and blood flow through the heart, lungs, body, and major blood vessels. Control of the heart rate. Structure and function of the lungs and disorders of the lungs.
6. Immunology (6.3 and 11.1). Components of the blood system. Blood clotting. Antibodies. Antibiotics and resistance. Steps of a specific immune response. Vaccination. Zoonosis. Monoclonal antibodies.
7. Muscles and Movement (11.2). Structure and function of muscle fibers. Be able to draw and label a sarcomere. Be able to outline the steps of a muscle contraction.
8. The Kidney (11.3). Be able to draw and label a human kidney. Be able to outline the parts of the nephron and what occurs at each part.
9. The Neuron (6.5). Be able to outline the structure and function of a neuron, how an action potential is transmitted down a neuron, and how an impulse is transmitted across a synapse.
10. Hormones and Reproduction (6.6 and 11.4). The function of some key hormones, including insulin and glucagon. Structure and function of male and female reproductive anatomy. Male and female reproductive hormones. The human menstrual cycle. Steps of fertilization, early embryonic development, labor, and the process of birth. Structure and functions of the placenta.
11. Cell Respiration and Photosynthesis (2.8, 2.9, 8.2, 8.3).
12. In addition, each student will choose a topic for an individual investigation, carry out that investigation, analyze the data, and write up a thorough conclusion and evaluation. This is typically done in January-February.