Ib biology syllabus pdf

AP BIOLOGY SYLLABUS

CURRICULAR REQUIREMENTS PAGE(S):

CR1 Students and teachers use a recently published (within the last 10 years) college-level biology textbook. 2

CR2 The course is structured around the enduring understandings within the big ideas as described in the AP® Biology Curriculum Framework. 2-10

CR3a Students connect the enduring understandings within Big Idea 1 (the process of evolution drives the diversity and unity of life) to at least one other big idea 9

CR3b Students connect the enduring understandings within Big Idea 2 (biological systems utilize free energy and molecular building blocks to grow, to reproduce, and to maintain dynamic homeostasis) to at least one other big idea. 4, 9

CR3c Students connect the enduring understandings within Big Idea 3 (living systems store, retrieve, transmit, and respond to information essential to life processes) to at least one other big idea. 9

CR3d Students connect the enduring understandings within Big Idea 4 (biological systems interact and these systems and their interactions possess complex properties) to at least one other big idea. 8

CR4a The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 1. 6, 9, 10

CR4b The course provides students with opportunities outside of the laboratory investigations to meet the learning objectives within Big Idea 2. 1, 4, 5

Biology

Course Description	Biology is devoted to the study of [illegible]esses. Throughout the year this course provides opportunities for students to develop scientific process skills, laboratory techniques, and an understanding of the fundamental principles of living organisms. Students will explore biological science as a process, cell structure and function, genetics and heredity, evolution and classification, diversity of living organisms and their ecological roles, and an introduction to animal structure and function. The course will consist of lecture, discussion, daily homework, and laboratory exercises. You will need to be an independent and critical thinker to be successful in class. The lab exercises are designed to provide you with hands-on opportunities to experience and understand the principals we are studying. You will be expected to demonstrate the ability to work within a lab group and complete the investigation within the time scheduled as well as work individually.
Course Content Objectives and Goals	• Teach students practical scientific skills, which they can use to investigate, study, and explain the world around them. • Give students a deeper understanding of the how biology impacts their daily lives. • To encourage the spirit of scientific investigation and with it the attitudes of accuracy in thought and work.
Behavior Expectations	It is expected that students act appropriately in class, follow all safety instructions and take responsibility for their actions. Failure to act in a sensible, responsible manner will result in appropriate disciplinary action as addressed in the handbook. <u>Class Expectations</u> • All school rules will be followed as stated in the student handbook. This includes NO HATS and NO CELL PHONES OR HEADPHONES! _____ _____ • Students are expected to be in their seat and ready when the bell rings. Door will be locked for students arriving late without a pass. Class and/or office detention will be assigned for lateness! _____ _____ • Materials (textbook, pencil, paper, and notebook) must be brought to class every day, without exception. If you do not bring needed materials to class you will NOT be allowed to go to your locker to get them. This will be reflected in your daily grade. _____ _____ • The laboratory station or room must be clean at the end of the class period before leaving. (Food and drink are never allowed). _____ _____ • Treat everyone with respect, including the learning environment. _____ _____ • Follow the instructions given by teacher or lesson. _____ _____ • All safety rules as stated in the Flinn Science Safety Agreement must be followed. You must sign and return in order to participate in labs. _____ _____
Academic Integrity Policy	ALL work is to be done individually. Plagiarism/ copying assignments from lab partners is **not acceptable**. We will strictly enforce the integrity policy of Classical High School. Please see your student handbook to review this policy.

Biology Syllabus – Dakota Junior/Senior High School

Course Title: Biology

Teacher: April Coaty — Bachelor of Science from Northern Illinois

Major- Biology, Secondary Education

Minor – Chemistry

Materials: A spiral notebook designated for Biology
Something to write with (you *may borrow from me, but I need it back*)
Textbook (you never know when you may need it)
Any other materials I ask you to bring in throughout the year

Outline of Course (we may go faster or slower depending on how quickly the class understands material)	
1st Grading Period –	*2nd Grading Period –*
What is Science?	Organelles
Chemistry behind the Science	Photosynthesis
Macromolecules	Cellular Respiration
3rd Grading Period –	*4th Grading Period –*
DNA	Classification
RNA and gene expression	Ecology
Genetics	

Ib biology syllabus 2016. Ib biology syllabus 2020 pdf. Ib biology syllabus 2022 pdf. Ib biology syllabus sl. Ib biology syllabus 2023. Ib biology syllabus hl. Ib biology syllabus outline. Ib biology syllabus 2024.

Image Credit: International Baccalaureate Organization. Core Topics (95 Hours) Topic 1. Cell biology (15 Hours) 1.1 Introduction to Cells 1.2 Ultrastructure of Cells 1.3 Membrane Structure 1.4 Membrane Transport 1.5 Origin of Cells 1.6 Cell Division Topic 2. Molecular biology (21 Hours) 2.1 Molecules to Metabolism 2.2 Water 2.3 Carbohydrates and Lipids 2.4 Proteins 2.5 Enzymes 2.6 Structure of DNA and RNA 2.7 DNA Replications, Transcription, and Translation 2.8 Cell Respiration 2.9 Photosynthesis Topic 3. Genetics (15 Hours) 3.1 Genes 3.2 Chromosomes 3.3 Meiosis 3.4 Inheritance 3.5 Genetic Modification and Biotechnology Topic 4. Ecology (12 Hours) 4.1 Species, Communities, and Ecosystems 4.2 Energy Flow 4.3 Carbon Cycling 4.4 Climate Change Topic 5. Evolution and biodiversity (12 Hours) 5.1 Evidence for Evolution 5.2 Natural Selection 5.3 Classification and Biodiversity 5.4 Cladistics Topic 6. Human physiology (20 Hours) 6.1 Digestion and Absorption 6.2 The Blood System 6.3 Defense Against Infectious Disease 6.4 Gas Exchange 6.5 Neurons and Synapses 6.6 Hormones, Homeostasis, and Reproduction Additional Higher Level Topics (60 Hours) Topic 7. Nucleic Acids (9 Hours) 7.1 DNA Structure and Replication 7.2 Transcription and Gene Expression 7.3 Translation Topic 8. Metabolism, Cell Respiration and Photosynthesis (14 Hours) 8.1 Metabolism 8.2 Cell Respiration 8.3 Photosynthesis Topic 9. Plant Biology (13 Hours) 9.1 Transport in the Xylem of Plants 9.2 Transport in the Phloem of Plants 9.3 Growth in Plants 9.4 Reproduction in Plants Topic 10. Genetics and Evolution (8 Hours) 10.1 Meiosis 10.2 Inheritance 10.3 Gene Pools and Speciation Topic 11. Animal Physiology (16 Hours) 11.1 Antibody Production and Vaccination 11.2 Movement 11.3 Kidney and Osmoregulation 11.4 Sexual Reproduction Optional Topics Option A. Neurobiology and Behaviour (15 Hours for SL and 25 hours for HL) A.1 Neural development A.2 The human brain A.3 Perception of stimuli A.4 Innate and learned behavior (Higher Level Only) A.5 Neuropharmacology (Higher Level Only) A.6 Ethology (Higher Level Only) Option B. Biotechnology and Bioinformatics (15 Hours for SL and 25 hours for HL) B.1 Microbiology: organisms in industry B.2 Biotechnology in agriculture B.3 Environmental protection B.4 Medicine (Higher Level Only) B.5 Bioinformatics (Higher Level Only) Option C. Ecology and Conservation (15 Hours for SL and 25 hours for HL) C.1 Species and communities C.2 Communities and ecosystems C.3 Impacts of humans on ecosystems C.4 Conservation of biodiversity C.5 Population ecology (Higher Level Only) C.6 Nitrogen and phosphorus cycles (Higher Level Only) Option D. Human Physiology (15 Hours for SL and 25 hours for HL) D.1 Human Nutrition D.2 Digestion D.3 Functions of the Liver D.4 The Heart D.5 Hormones and Metabolism (Higher Level Only) D.6 Transport of Respiratory Gases (Higher Level Only) Practical scheme of work (40 Hours) Prescribed and other practical activities (20 Hours) Individual investigation (10 Hours) Group 4 project (10 Hours) References and Sources Oh, IB Biology. I took IB Biology SL back in my high school days. If you are looking at this syllabus, you're likely interested in taking the course or are currently enrolled in the course. In this article, I will go over the topics covered in IB Biology Standard Level and IB Biology Higher Level, as well as the number of hours dedicated to each topic along with what the IB expects you to understand for each topic. 2022 IB Exam Changes Due to COVID-19 Because of the ongoing COVID-19 (coronavirus) pandemic, the IB has decided to extend the adaptations which were put in place for 2021 to 2022. May 2022 IB assessments will have two routes, exam and non-exam, depending on which your school chooses. Stay up to date with the latest information on what this means for IB diplomas, course credit for IB classes, and more with our our IB COVID-19 FAQ article. IB Biology SL and HL Core Both IB Biology SL and HL consist of the same core requirements (95 hours). Both classes cover the same six topics in the order listed below with the same subtopics listed below: Topic 1: Cell Biology—15 Hours for Both SL and HL Subtopic Subtopic Number IB Points to Understand Introduction to cells 1.1 According to the cell theory, living organisms are composed of cells. Organisms consisting of only one cell carry out all functions of life in that cell. Surface area to volume ratio is important in the limitation of cell size. Multicellular organisms have properties that emerge from the interaction of their cellular components. Specialized tissues can develop by cell differentiation in multicellular organisms. Differentiation involves the expression of some genes and not others in a cell's genome. The capacity of stem cells to divide and differentiate along different pathways is necessary in embryonic development and also makes stem cells suitable for therapeutic uses. Ultrastructure of cells 1.2 Prokaryotes have a simple cell structure without compartmentalization. Eukaryotes have a compartmentalized cell structure. Electron microscopes have a much higher resolution than light microscopes. Membrane structure 1.3 Phospholipids form bilayers in water due to the amphipathic properties of phospholipid molecules. Membrane proteins are diverse in terms of structure, position in the membrane and function. Cholesterol is a component of animal cell membranes. Membrane transport 1.4 Particles move across membranes by simple diffusion, facilitated diffusion, osmosis and active transport. The fluidity of membranes allows materials to be taken into cells by endocytosis or released by exocytosis. Vesicles move materials within cells. The origin of cells 1.5 Cells can only be formed by division of pre-existing cells. The first cells must have arisen from non-living material. The origin of eukaryotic cells can be explained by the endosymbiotic theory. Cell division 1.6 Mitosis is division of the nucleus into two genetically identical daughter nuclei. Chromosomes condense by supercoiling during mitosis. Cytokinesis occurs after mitosis and is different in plant and animal cells. Interphase is a very active phase of the cell cycle with many processes occurring in the nucleus and cytoplasm. Cyclins are involved in the control of the cell cycle. Mutagens, oncogenes and metastasis are involved in the development of primary and secondary tumours. Topic 2: Molecular Biology—21 Hours for Both SL and HL Subtopic Subtopic Number IB Points to Understand Molecules to metabolism 2.1 Molecular biology explains living processes in terms of the chemical substances involved. Carbon atoms can form four covalent bonds allowing a diversity of stable compounds to exist. Life is based on carbon compounds including carbohydrates, lipids, proteins and nucleic acids. Metabolism is the web of all the enzyme-catalysed reactions in a cell or organism. Anabolism is the synthesis of complex molecules from simpler molecules including the formation of macromolecules from monomers by condensation reactions. Catabolism is the breakdown of complex molecules into simpler molecules including the hydrolysis of macromolecules into monomers. Water 2.2 Water molecules are polar and hydrogen bonds form between them. Hydrogen bonding and dipolarity explain the cohesive, adhesive, thermal and solvent properties of water. Substances can be hydrophilic or hydrophobic. Carbohydrates and lipids 2.3 Monosaccharide monomers are linked together by condensation reactions to form disaccharides and polysaccharide polymers. Fatty acids can be saturated, monounsaturated or polyunsaturated. Unsaturated fatty acids can be cis or trans isomers. Triglycerides are formed by condensation from three fatty acids and one glycerol. Proteins 2.4 Amino acids are linked together by condensation to form polypeptides. There are 20 different amino acids in polypeptides synthesized on ribosomes. Amino acids can be linked together in any sequence giving a huge range of possible polypeptides. The amino acid sequence of polypeptides is coded for by genes. A protein may consist of a single polypeptide or more than one polypeptide linked together. The amino acid sequence determines the three-dimensional conformation of a protein. Living organisms synthesize many different proteins with a wide range of functions. Every individual has a unique proteome. Enzymes 2.5 Enzymes have an active site to which specific substrates bind. Enzyme catalysis involves molecular motion and the collision of substrates with the active site. Temperature, pH and substrate concentration affect the rate of activity of enzymes. Enzymes can be denatured. Immobilized enzymes are widely used in industry. Structure of DNA and RNA 2.6 The nucleic acids DNA and RNA are polymers of nucleotides. DNA differs from RNA in the number of strands present, the base composition and the type of pentose. DNA is a double helix made of two antiparallel strands of nucleotides linked by hydrogen bonding between complementary base pairs. DNA replication, transcription and translation 2.7 The replication of DNA is semi-conservative and depends on complementary base pairing. Helicase unwinds the double helix and separates the two strands by breaking hydrogen bonds. DNA polymerase links nucleotides together to form a new strand, using the pre-existing strand as a template. Transcription is the synthesis of mRNA copied from the DNA base sequences by RNA polymerase. Translation is the synthesis of polypeptides on ribosomes. The amino acid sequence of polypeptides is determined by mRNA according to the genetic code. Codons of three bases on mRNA correspond to one amino acid in a polypeptide. Translation depends on complementary base pairing between codons on mRNA and anticodons on tRNA. Cell respiration 2.8 Cell respiration is the controlled release of energy from organic compounds to produce ATP. ATP from cell respiration is immediately available as a source of energy in the cell. Anaerobic cell respiration gives a small yield of ATP from glucose. Aerobic cell respiration requires oxygen and gives a large yield of ATP from glucose. Photosynthesis 2.9 Photosynthesis is the production of carbon compounds in cells using light energy. Visible light has a range of wavelengths with violet the shortest wavelength and red the longest. Chlorophyll absorbs red and blue light most effectively and reflects green light more than other colours. Oxygen is produced in photosynthesis from the photolysis of water. Energy is needed to produce carbohydrates and other carbon compounds from carbon dioxide. Temperature, light intensity and carbon dioxide concentration are possible limiting factors on the rate of photosynthesis. Topic 3: Genetics—15 Hours for Both SL and HL Subtopic Subtopic Number IB Points to Understand Genes 3.1 A gene is a heritable factor that consists of a length of DNA and influences a specific characteristic. A gene occupies a specific position on a chromosome. The various specific forms of a gene are alleles. Alleles differ from each other by one or only a few bases. New alleles are formed by mutation. The genome is the whole of the genetic information of an organism. The entire base sequence of human genes was sequenced in the Human Genome Project. Chromosomes 3.2 Prokaryotes have one chromosome consisting of a circular DNA molecule. Some prokaryotes also have plasmids but eukaryotes do not. Eukaryote chromosomes are linear DNA molecules associated with histone proteins. In a eukaryote species there are different chromosomes that carry different genes. Homologous chromosomes carry the same sequence of genes but not necessarily the same alleles of those genes. Diploid nuclei have pairs of homologous chromosomes. Haploid nuclei have one chromosome of each pair. The number of chromosomes is a characteristic feature of members of a species. A karyogram shows the chromosomes of an organism in homologous pairs of decreasing length. Sex is determined by sex chromosomes and autosomes are chromosomes that do not determine sex. Meiosis 3.3 One diploid nucleus divides by meiosis to produce four haploid nuclei. The halving of the chromosome number allows a sexual life cycle with fusion of gametes. DNA is replicated before meiosis so that all chromosomes consist of two sister chromatids. The early stages of meiosis involve pairing of homologous chromosomes and crossing over followed by condensation. Orientation of pairs of homologous chromosomes prior to separation is random. Separation of pairs of homologous chromosomes in the first division of meiosis halves the chromosome number. Crossing over and random orientation promotes genetic variation. Fusion of gametes from different parents promotes genetic variation. Inheritance 3.4 Mendel discovered the principles of inheritance with experiments in which large numbers of pea plants were crossed. Gametes are haploid so contain only one allele of each gene. The two alleles of each gene separate into different haploid daughter nuclei during meiosis. Fusion of gametes results in diploid zygotes with two alleles of each gene that may be the same allele or different alleles. Dominant alleles mask the effects of recessive alleles but co-dominant alleles have joint effects. Many genetic diseases in humans are due to recessive alleles of autosomal genes, although some genetic diseases are due to dominant or co-dominant alleles. Some genetic diseases are sex-linked. The pattern of inheritance is different with sex-linked genes due to their location on sex chromosomes. Many genetic diseases have been identified in humans but most are very rare. Radiation and mutagenic chemicals increase the mutation rate and can cause genetic diseases and cancer. Genetic modification and biotechnology 3.5 Gel electrophoresis is used to separate proteins or fragments of DNA according to size. PCR can be used to amplify small amounts of DNA. DNA profiling involves comparison of DNA. Genetic modification is carried out by gene transfer between species. Clones are groups of genetically identical organisms, derived from a single original parent cell. Many plant species and some animal species have natural methods of cloning. Animals can be cloned at the embryo stage by breaking up the embryo into more than one group of cells. Methods have been developed for cloning adult animals using differentiated cells. Topic 4: Ecology—12 Hours for Both SL and HL Subtopic Subtopic Number IB Points to Understand Species, communities and ecosystems 4.1 Species are groups of organisms that can potentially interbreed to produce fertile offspring. Members of a species may be reproductively isolated in separate populations. Species have either an autotrophic or heterotrophic method of nutrition (a few species have both methods). Consumers are heterotrophs that feed on living organisms by ingestion. Detritivores are heterotrophs that obtain organic nutrients from detritus by internal digestion. Saprotrophs are heterotrophs that obtain organic nutrients from dead organisms by external digestion. A community is formed by populations of different species living together and interacting with each other. A community forms an ecosystem by its interactions with the abiotic environment. Autotrophs obtain inorganic nutrients from the abiotic environment. The supply of inorganic nutrients is maintained by nutrient cycling. Ecosystems have the potential to be sustainable over long periods of time. Energy flow 4.2 Most ecosystems rely on a supply of energy from sunlight. Light energy is converted to chemical energy in carbon compounds by photosynthesis. Chemical energy in carbon compounds flows through food chains by means of feeding. Energy released from carbon compounds by respiration is used in living organisms and converted to heat. Living organisms cannot convert heat to other forms of energy. Heat is lost from ecosystems. Energy losses between trophic levels restrict the length of food chains and the biomass of higher trophic levels. Carbon cycling 4.3 Autotrophs convert carbon dioxide into carbohydrates and other carbon compounds. In aquatic ecosystems carbon is present as dissolved carbon dioxide and hydrogen carbonate ions. Carbon dioxide diffuses from the atmosphere or water into autotrophs. Carbon dioxide is produced by respiration and diffuses out of organisms into water or the atmosphere. Methane is produced from organic matter in anaerobic conditions by methanogenic archaeans and some diffuses into the atmosphere or accumulates in the ground. Methane is oxidized to carbon dioxide and water in the atmosphere. Peat forms when organic matter is not fully decomposed because of acidic and/or anaerobic conditions in waterlogged soils. Partially decomposed organic matter from past geological eras was converted either into coal or into oil and gas that accumulate in porous rocks. Carbon dioxide is produced by the combustion of biomass and fossilized organic matter. Animals such as reef-building corals and mollusca have hard parts that are composed of calcium carbonate and can become fossilized in limestone. Climate change 4.4 Carbon dioxide and water vapour are the most significant greenhouse gases. Other gases including methane and nitrogen oxides have less impact. The impact of a gas depends on its ability to absorb long wave radiation as well as on its concentration in the atmosphere. The warmed Earth emits longer wavelength radiation (heat). Longer wave radiation is absorbed by greenhouse gases that retain the heat in the atmosphere. Global temperatures and climate patterns are influenced by concentrations of greenhouse gases. There is a correlation between rising atmospheric concentrations of carbon dioxide since the start of the industrial revolution 200 years ago and average global temperatures. Recent increases in atmospheric carbon dioxide are largely due to increases in the combustion of fossilized organic matter. Topic 5: Evolution and Biodiversity—12 Hours for Both SL and HL Subtopic Subtopic Number IB Points to Understand Evidence for evolution 5.1 Evolution occurs when heritable characteristics of a species change. The fossil record provides evidence for evolution. Selective breeding of domesticated animals shows that artificial selection can cause evolution. Evolution of homologous structures by adaptive radiation explains similarities in structure when there are differences in function. Populations of a species can gradually diverge into separate species by evolution. Continuous variation across the geographical range of related populations matches the concept of gradual divergence. Natural selection 5.2 Natural selection can only occur if there is variation among members of the same species. Mutation, meiosis and sexual reproduction cause variation between individuals in a species. Adaptations are characteristics that make an individual suited to its environment and way of life. Species tend to produce more offspring than the environment can support. Individuals that are better adapted tend to survive and produce more offspring while the less well adapted tend to die or produce fewer offspring. Individuals that reproduce pass on characteristics to their offspring. Natural selection increases the frequency of characteristics that make individuals better adapted and decreases the frequency of other characteristics leading to changes within the species. Classification of biodiversity 5.3 The binomial system of names for species is universal among biologists and has been agreed and developed at a series of congresses. When species are discovered they are given scientific names using the binomial system. Taxonomists classify species using a hierarchy of taxa. All organisms are classified into three domains. The principal taxa for classifying eukaryotes are kingdom, phylum, class, order, family, genus and species. In a natural classification, the genus and accompanying higher taxa consist of all the species that have evolved from one common ancestral species. Taxonomists sometimes reclassify groups of species when new evidence shows that a previous taxon contains species that have evolved from different ancestral species. Natural classifications help in identification of species and allow the prediction of characteristics shared by species within a group. Cladistics 5.4 A clade is a group of organisms that have evolved from a common ancestor. Evidence for which species are part of a clade can be obtained from the base sequences of a gene or the corresponding amino acid sequence of a protein. Sequence differences accumulate gradually so there is a positive correlation between the number of differences between two species and the time since they diverged from a common ancestor. Traits can be analogous or homologous. Cladograms are tree diagrams that show the most probable sequence of divergence in clades. Evidence from cladistics has shown that classifications of some groups based on structure did not correspond with the evolutionary origins of a group or species. Topic 6: Human Physiology—20 Hours for Both SL and HL Subtopic Subtopic Number IB Points to Understand Digestion and absorption 6.1 The contraction of circular and longitudinal muscle of the small intestine mixes the food with enzymes and moves it along the gut. The pancreas secretes enzymes into the lumen of the small intestine. Enzymes digest most macromolecules in food into monomers in the small intestine. Villi increase the surface area of epithelium over which absorption is carried out. Villi absorb monomers formed by digestion as well as mineral ions and vitamins. Different methods of membrane transport are required to absorb different nutrients. The blood system 6.2 Arteries convey blood at high pressure from the ventricles to the tissues of the body. Arteries have muscle cells and elastic fibres in their walls. The muscle and elastic fibres assist in maintaining blood pressure between pump cycles. Blood flows through tissues in capillaries. Capillaries have permeable walls that allow exchange of materials between cells in the tissue and the blood in the capillary. Veins collect blood at low pressure from the tissues of the body and return it to the atria of the heart. Valves in veins and the heart ensure circulation of blood by preventing backflow. There is a separate circulation for the lungs. The heart beat is initiated by a group of specialized muscle cells in the right atrium called the sinoatrial node. The sinoatrial node acts as a pacemaker. The sinoatrial node sends out an electrical signal that stimulates contraction as it is propagated through the walls of the atria and then the walls of the ventricles. The heart rate can be increased or decreased by impulses brought to the heart through two nerves from the medulla of the brain. Epinephrine increases the heart rate to prepare for vigorous physical activity. Defense against infectious disease 6.3 The skin and mucous membranes form a primary defense against pathogens that cause infectious disease. Cuts in the skin are sealed by blood clotting. Clotting factors are released from platelets. The cascade results in the rapid conversion of fibrinogen to fibrin by thrombin. Ingestion of pathogens by phagocytic white blood cells gives non-specific immunity to diseases. Production of antibodies by lymphocytes in response to particular pathogens gives specific immunity. Antibiotics block processes that occur in prokaryotic cells but not in eukaryotic cells. Viruses lack a metabolism and cannot therefore be treated with antibiotics. Some strains of bacteria have evolved with genes that confer resistance to antibiotics and some strains of bacteria have multiple resistance. Gas exchange 6.4 Ventilation maintains concentration gradients of oxygen and carbon dioxide between air in alveoli and blood flowing in adjacent capillaries. Type I pneumocytes are extremely thin alveolar cells that are adapted to carry out gas exchange. Type II pneumocytes secrete a solution containing surfactant that creates a moist surface inside the alveoli to prevent the sides of the alveolus adhering to each other by reducing surface tension. Air is carried to the lungs in the trachea and bronchi and then to the alveoli in bronchioles. Muscle contractions cause the pressure changes inside the thorax that force air in and out of the lungs to ventilate them. Different muscles are required for inspiration and expiration because muscles only do work when they contract. Neurons and synapses 6.5 Neurons transmit electrical impulses. The myelination of nerve fibres allows for saltatory conduction. Neurons pump sodium and potassium ions across their membranes to generate a resting potential. An action potential consists of depolarization and repolarization of the neuron. Nerve impulses are action potentials propagated along the axons of neurons. Propagation of nerve impulses is the result of local currents that cause each successive part of the axon to reach the threshold potential. Synapses are junctions between neurons and between neurons and receptor or effector cells. When presynaptic neurons are depolarized they release a neurotransmitter into the synapse. A nerve impulse is only initiated if the threshold potential is reached. Hormones, homeostasis and reproduction 6.6 Insulin and glucagon are secreted by β and α cells of the pancreas respectively to control blood glucose concentration. Thyroxin is secreted by the thyroid gland to regulate the metabolic rate and help control body temperature. Leptin is secreted by cells in adipose tissue and acts on the hypothalamus of the brain to inhibit appetite. Melatonin is secreted by the pineal gland to control circadian rhythms. A gene on the Y chromosome causes embryonic gonads to develop as testes and secrete testosterone. Testosterone causes pre-natal development of male genitalia and both sperm production and development of male secondary sexual characteristics during puberty. Estrogen and progesterone cause pre-natal development of female reproductive organs and female secondary sexual characteristics during puberty. The menstrual cycle is controlled by negative and positive feedback mechanisms involving ovarian and pituitary hormones. Additional Higher Level Topics Only students taking IB Biology HL cover these topics. They consist of 60 hours of study. Topic 7: Nucleic Acids—9 Hours for HL Only Subtopic Subtopic Number IB Points to Understand DNA structure and replication (HL ONLY) 7.1 Nucleosomes help to supercoil the DNA. DNA structure suggested a mechanism for DNA replication. DNA polymerases can only add nucleotides to the 3' end of a primer. DNA replication is continuous on the leading strand and discontinuous on the lagging strand. DNA replication is carried out by a complex system of enzymes. Some regions of DNA do not code for proteins but have other important functions. Transcription and gene expression (HL ONLY) 7.2 Transcription occurs in a 5' to 3' direction. Nucleosomes help to regulate transcription in eukaryotes. Eukaryotic cells modify mRNA after transcription. Splicing of mRNA increases the number of different proteins an organism can produce. Gene expression is regulated by proteins that bind to specific base sequences in DNA. The environment of a cell and of an organism has an impact on gene expression. Translation (HL ONLY) 7.3 Initiation of translation involves assembly of the components that carry out the process. Synthesis of the polypeptide involves a repeated cycle of events. Disassembly of the components follows termination of translation. Free ribosomes synthesize proteins for use primarily within the cell. Bound ribosomes synthesize proteins primarily for secretion or for use in lysosomes. Translation can occur immediately after transcription in prokaryotes due to the absence of a nuclear membrane. The sequence and number of amino acids in the polypeptide is the primary structure. The secondary structure is the formation of alpha helices and beta pleated sheets stabilized by hydrogen bonding. The tertiary structure is the further folding of the polypeptide stabilized by interactions between R groups. The quaternary structure exists in proteins with more than one polypeptide chain. Want to build the best possible college application? We can help. PrepScholar Admissionsis the world's best admissions consulting service. We combine world-class admissions counselors with our data-driven, proprietary admissions strategies. We've overseen thousands of students get into their top choice schools, from state colleges to the Ivy League. We know what kinds of students colleges want to admit. We want to get you admitted to your dream schools. Learn more about PrepScholar Admissions to maximize your chance of getting in. Topic 8: Metabolism, Cell Respiration, and Photosynthesis—14 Hours for HL Only Subtopic Subtopic Number IB Points to Understand Metabolism (HL ONLY) 8.1 Metabolic pathways consist of chains and cycles of enzyme-catalysed reactions. Enzymes lower the activation energy of the chemical reactions that they catalyse. Enzyme inhibitors can be competitive or non-competitive. Metabolic pathways can be controlled by end-product inhibition. Cell respiration (HL ONLY) 8.2 Cell respiration involves the oxidation and reduction of electron carriers. Phosphorylation of molecules makes them less stable. In glycolysis, glucose is converted to pyruvate in the cytoplasm. Glycolysis gives a small net gain of ATP without the use of oxygen. In aerobic cell respiration pyruvate is decarboxylated and oxidized, and converted into acetyl compound and attached to coenzyme A to form acetyl coenzyme A in the link reaction. In the Krebs cycle, the oxidation of acetyl groups is coupled to the reduction of hydrogen carriers, liberating carbon dioxide. Energy released by oxidation reactions is carried to the cristae of the mitochondria by reduced NAD and FAD. Transfer of electrons between carriers in the electron transport chain in the membrane of the cristae is coupled to proton pumping. In chemiosmosis protons diffuse through ATP synthase to generate ATP. Oxygen is needed to bind with the free protons to maintain the hydrogen gradient, resulting in the formation of water. The structure of the mitochondrion is adapted to the function it performs. Photosynthesis (HL ONLY) 8.3 Light-dependent reactions take place in the intermembrane space of the thylakoids. Light-independent reactions take place in the stroma. Reduced NADP and ATP are produced in the light-dependent reactions. Absorption of light by photosystems generates excited electrons. Photolysis of water generates electrons for use in the light-dependent reactions. Transfer of excited electrons occurs between carriers in thylakoid membranes. Excited electrons from Photosystem II are used to contribute to generate a proton gradient. ATP synthase in thylakoids generates ATP using the proton gradient. Excited electrons from Photosystem I are used to reduce NADP. In the light-independent reactions a carboxylase catalyses the carboxylation of ribulose bisphosphate. Glycerate 3-phosphate is reduced to triose phosphate using reduced NADP and ATP. Triose phosphate is used to regenerate RuBP and produce carbohydrates. Ribulose bisphosphate is reformed using ATP. The structure of the chloroplast is adapted to its function in photosynthesis. Topic 9: Plant Biology—13 Hours for HL Only Subtopic Subtopic Number IB Points to Understand Transport in the xylem of plants (HL ONLY) 9.1 Transpiration is the inevitable consequence of gas exchange in the leaf. Plants transport water from the roots to the leaves to replace losses from transpiration. The cohesive property of water and the structure of the xylem vessels allow transport under tension. The adhesive property of water and evaporation generate tension forces in leaf cell walls. Active uptake of mineral ions in the roots causes absorption of water by osmosis. Transport in the phloem of plants (HL ONLY) 9.2 Plants transport organic compounds from sources to sinks. Incompressibility of water allows transport along hydrostatic pressure gradients. Active transport is used to load organic compounds into phloem sieve tubes at the source. High concentrations of solutes in the phloem at the source lead to water uptake by osmosis. Raised hydrostatic pressure causes the contents of the phloem to flow towards sinks. Growth in plants (HL ONLY) 9.3 Undifferentiated cells in the meristems of plants allow indeterminate growth. Mitosis and cell division in the shoot apex provide cells needed for extension of the stem and development of leaves. Plant hormones control growth in the shoot apex. Plant shoots respond to the environment by tropisms. Auxin efflux pumps can set up concentration gradients of auxin in plant tissue. Auxin influences cell growth rates by changing the pattern of gene expression. Reproduction in plants (HL ONLY) 9.4 Flowering involves a change in gene expression in the shoot apex. The switch to flowering is a response to the length of light and dark periods in many plants. Success in plant reproduction depends on pollination, fertilization and seed dispersal. Most flowering plants use mutualistic relationships with pollinators in sexual reproduction. Topic #10: Genetics and Evolution—8 Hours for HL Only Subtopic Subtopic Number IB Points to Understand Meiosis (HL ONLY) 10.1 Chromosomes replicate in interphase before meiosis. Crossing over is the exchange of DNA material between non-sister homologous chromatids. Crossing over produces new combinations of alleles on the chromosomes of the haploid cells. Chiasmata formation between non-sister chromatids can result in an exchange of alleles. Homologous chromosomes separate in meiosis I. Sister chromatids separate in meiosis II. Independent assortment of genes is due to the random orientation of pairs of homologous chromosomes in meiosis I. Inheritance (HL ONLY) 10.2 Gene loci are said to be linked if on the same chromosome. Unlinked genes segregate independently as a result of meiosis. Variation can be discrete or continuous. The phenotypes of polygenic characteristics tend to show continuous variation. Chi-squared tests are used to determine whether the difference between an observed and expected frequency distribution is statistically significant. Gene pools and speciation (HL ONLY) 10.3 A gene pool consists of all the genes and their different alleles, present in an interbreeding population. Evolution requires that allele frequencies change with time in populations. Reproductive isolation of populations can be temporal, behavioural or geographic. Speciation due to divergence of isolated populations can be gradual. Speciation can occur abruptly. Topic 11: Animal Physiology—16 Hours for HL Only Subtopic Subtopic Number IB Points to Understand Antibody production and vaccination (HL ONLY) 11.1 Every organism has unique molecules on the surface of its cells. Pathogens can be species-specific although others can cross species barriers. B lymphocytes are activated by T lymphocytes in mammals. Activated B cells multiply to form clones of plasma cells and memory cells. Plasma cells secrete antibodies. Antibodies aid the destruction of pathogens. White cells release histamine in response to allergens. Histamines cause allergic symptoms. Immunity depends upon the persistence of memory cells. Vaccines contain antigens that trigger immunity but do not cause the disease. Fusion of a tumour cell with an antibody-producing plasma cell creates a hybridoma cell. Monoclonal antibodies are produced by hybridoma cells. Movement (HL ONLY) 11.2 Bones and exoskeletons provide anchorage for muscles and act as levers. Synovial joints allow certain movements but not others. Movement of the body requires muscles to work in antagonistic pairs. Skeletal muscle fibres are multinucleate and contain specialized endoplasmic reticulum. Muscle fibres contain many myofibrils. Each myofibril is made up of contractile sarcomeres. The contraction of the skeletal muscle is achieved by the sliding of actin and myosin filaments. ATP hydrolysis and cross bridge formation are necessary for the filaments to slide. Calcium ions and the proteins tropomyosin and troponin control muscle contractions. The kidney and osmoregulation (HL ONLY) 11.3 Animals are either osmoregulators or osmoconformers. The Malpighian tubule system in insects and the kidney carry out osmoregulation and removal of nitrogenous wastes. The composition of blood in the renal artery is different from that in the renal vein. The ultrastructure of the glomerulus and Bowman's capsule facilitate ultrafiltration. The proximal convoluted tubule selectively reabsorbs useful substances by active transport. The loop of Henle maintains hypertonic conditions in the medulla. ADH controls reabsorption of water in the collecting duct. The length of the loop of Henle is positively correlated with the need for water conservation in animals. The type of nitrogenous waste in animals is correlated with evolutionary history and habitat. Sexual reproduction (HL ONLY) 11.4 Spermatogenesis and oogenesis both involve mitosis, cell growth, two divisions of meiosis and differentiation. Processes in spermatogenesis and oogenesis result in different numbers of gametes with different amounts of cytoplasm. Fertilization in animals can be internal or external. Fertilization involves mechanisms that prevent polyspermy. Implantation of the blastocyst in the endometrium is essential for the continuation of pregnancy. HCG stimulates the ovary to secrete progesterone during early pregnancy. The placenta facilitates the exchange of materials between the mother and fetus. Estrogen and progesterone are secreted by the placenta once it has formed. Birth is mediated by positive feedback involving estrogen and oxytocin. One of the single most important parts of your college application is what classes you choose to take in high school (in conjunction with how well you do in those classes). Our team of PrepScholar admissions experts have compiled their knowledge into this single guide to planning out your high school course schedule. We'll advise you on how to balance your schedule between regular and honors/AP/IB courses, how to choose your extracurriculars, and what classes you can't afford not to take. Options As a part of the IB Biology class, you'll cover one additional subject from the options below. (Typically you don't choose, but rather your teacher does.) Whichever option you or your teacher chooses, you'll cover three or four topics (15 hours total) for SL and an additional two or three topics (25 hours total) for HL. Option A: Neurobiology and Behaviour—15 Hours for SL and 25 hours for HL Subtopic Subtopic Number IB Points to Understand Neural development A.1 The neural tube of embryonic chordates is formed by infolding of ectoderm followed by elongation of the tube. Neurons are initially produced by differentiation in the neural tube. Immature neurons migrate to a final location. An axon grows from each immature neuron in response to chemical stimuli. Some axons extend beyond the neural tube to reach other parts of the body. A developing neuron forms multiple synapses. Synapses that are not used do not persist. Neural pruning involves the loss of unused neurons. The plasticity of the nervous system allows it to change with experience. The human brain A.2 The anterior part of the neural tube expands to form the brain. Different parts of the brain have specific roles. The autonomic nervous system controls involuntary processes in the body using centres located mainly in the brain stem. The cerebral cortex forms a larger proportion of the brain and is more highly developed in humans than other animals. The human cerebral cortex has become enlarged principally by an increase in total area with extensive folding to accommodate it within the cranium. The cerebral hemispheres are responsible for higher order functions. The left cerebral hemisphere receives sensory input from sensory receptors in the right side of the body and the right side of the visual field in both eyes and vice versa for the right hemisphere. The left cerebral hemisphere controls muscle contraction in the right side of the body and vice versa for the right hemisphere. Brain metabolism requires large energy inputs. Perception of stimuli A.3 Receptors detect changes in the environment. Rods and cones are photoreceptors located in the retina. Rods and cones differ in their sensitivities to light intensities and wavelengths. Bipolar cells send the impulses from rods and cones to ganglion cells. Ganglion cells send messages to the brain via the optic nerve. The information from the right field of vision from both eyes is sent to the left part of the visual cortex and vice versa. Structures in the middle ear transmit and amplify sound. Sensory hairs of the cochlea detect sounds of specific wavelengths. Impulses caused by sound perception are transmitted to the brain via the auditory nerve. Hair cells in the semicircular canals detect movement of the head. Additional HL Neurobiology and Behaviour Topics—10 More Hours for HL Innate and learned behaviour (HL ONLY) A.4 Innate behaviour is inherited from parents and so develops independently of the environment. Autonomic and involuntary responses are referred to as reflexes. Reflex arcs comprise the neurons that mediate reflexes. Reflex conditioning involves forming new associations. Learned behaviour develops as a result of experience. Imprinting is learning occurring at a particular life stage and is independent of the consequences of behaviour. Operant conditioning is a form of learning that consists of trial and error experiences. Learning is the acquisition of skill or knowledge. Memory is the process of encoding, storing and accessing information. Neuropharmacology (HL ONLY) A.5 Some neurotransmitters excite nerve impulses in postsynaptic neurons and others inhibit them. Nerve impulses are initiated or inhibited in post-synaptic neurons as a result of summation of all excitatory and inhibitory neurotransmitters received from presynaptic neurones. Many different slow-acting neurotransmitters modulate fast synaptic transmission in the brain. Memory and learning involve changes in neurones caused by slow-acting neurotransmitters. Psychoactive drugs affect the brain by either increasing or decreasing postsynaptic transmission. Anesthetics act by interfering with neural transmission between areas of sensory perception and the CNS. Stimulant drugs mimic the stimulation provided by the sympathetic nervous system. Addiction can be affected by genetic predisposition, social environment and dopamine secretion. Ethology (HL ONLY) A.6 Ethology is the study of animal behaviour in natural conditions. Natural selection can change the frequency of observed animal behaviour. Behaviour that increases the chances of survival and reproduction will become more prevalent in a population. Learned behaviour can spread through a population or be lost from it more rapidly than innate behaviour. Option B: Biotechnology and Bioinformatics—15 Hours for SL and HL Subtopic Subtopic Number IB Points to Understand Microbiology: organisms in industry B.1 Microorganisms are metabolically diverse. Microorganisms are used in industry because they are small and have a fast growth rate. Pathway engineering optimizes genetic and regulatory processes within microorganisms. Pathway engineering is used industrially to produce metabolites of interest. Fermenters allow large-scale production of metabolites by microorganisms. Fermentation is carried out by batch or continuous culture. Microorganisms in fermenters become limited by

their own waste products. Probes are used to monitor conditions within fermenters. Conditions are maintained at optimal levels for the growth of the microorganisms being cultured. Biotechnology in agriculture B.2 Transgenic organisms produce proteins that were not previously part of their species' proteome. Genetic modification can be used to overcome environmental resistance to increase crop yields. Genetically modified crop plants can be used to produce novel products. Bioinformatics plays a role in identifying target genes. The target gene is linked to other sequences that control its expression. An open reading frame is a significant length of DNA from a start codon to a stop codon. Marker genes are used to indicate successful uptake. Recombinant DNA must be inserted into the plant cell and taken up by its chromosome or chloroplast DNA. Recombinant DNA can be introduced into whole plants, leaf discs or protoplasts. Recombinant DNA can be introduced by direct physical and chemical methods or indirectly by vectors. Environmental protection B.3 Responses to pollution incidents can involve bioremediation combined with physical and chemical procedures. Microorganisms are used in bioremediation. Some pollutants are metabolized by microorganisms. Cooperative aggregates of microorganisms can form biofilms. Biofilms possess emergent properties. Microorganisms growing in a biofilm are highly resistant to antimicrobial agents. Microorganisms in biofilms cooperate through quorum sensing. Bacteriophages are used in the disinfection of water systems. Additional HL Biotechnology and Bioinfomatics Topics—10 More Hours for HL Medicine (HL ONLY) B.4 Infection by a pathogen can be detected by the presence of its genetic material or by its antigens. Predisposition to a genetic disease can be detected through the presence of markers. DNA microarrays can be used to test for genetic predisposition or to diagnose the disease. Metabolites that indicate disease can be detected in blood and urine. Tracking experiments are used to gain information about the localization and interaction of a desired protein. Biopharming uses genetically modified animals and plants to produce proteins for therapeutic use. Viral vectors can be used in gene therapy. Bioinformatics (HL ONLY) B.5 Databases allow scientists easy access to information. The body of data stored in databases is increasing exponentially. BLAST searches can identify similar sequences in different organisms. Gene function can be studied using model organisms with similar sequences. Sequence alignment software allows comparison of sequences from different organisms. BLASTn allows nucleotide sequence alignment while BLASTp allows protein alignment. Databases can be searched to compare newly identified sequences with sequences of known function in other organisms. Multiple sequence alignment is used in the study of phylogenetics. EST is an expressed sequence tag that can be used to identify potential genes. Option C: Ecology and Conservation—15 Hours for SL and HL Subtopic Subtopic Number IB Points to Understand Species and communities C.1 The distribution of species is affected by limiting factors. Community structure can be strongly affected by keystone species. Each species plays a unique role within a community because of the unique combination of its spatial habitat and interactions with other species. Interactions between species in a community can be classified according to their effect. Two species cannot survive indefinitely in the same habitat if their niches are identical. Communities and ecosystems C.2 Most species occupy different trophic levels in multiple food chains. A food web shows all the possible food chains in a community. The percentage of ingested energy converted to biomass is dependent on the respiration rate. The type of stable ecosystem that will emerge in an area is predictable based on climate. In closed ecosystems energy but not matter is exchanged with the surroundings. Disturbance influences the structure and rate of change within ecosystems. Impacts of humans on ecosystems C.3 Introduced alien species can escape into local ecosystems and become invasive. Competitive exclusion and the absence of predators can lead to reduction in the numbers of endemic species when alien species become invasive. Pollutants become concentrated in the tissues of organisms at higher trophic levels by biomagnification. Macroplastic and microplastic debris has accumulated in marine environments. Conservation of biodiversity C.4 An indicator species is an organism used to assess a specific environmental condition. Relative numbers of indicator species can be used to calculate the value of a biotic index. In situ conservation may require active management of nature reserves or national parks. Ex situ conservation is the preservation of species outside their natural habitats. Biogeographic factors affect species diversity. Richness and evenness are components of biodiversity. Additional HL Ecology and Conservation Topics—10 More Hours for HL Population ecology (HL ONLY) C.5 Sampling techniques are used to estimate population size. The exponential growth pattern occurs in an ideal, unlimited environment. Population growth slows as a population reaches the carrying capacity of the environment. The phases shown in the sigmoid curve can be explained by relative rates of natality, mortality, immigration and emigration. Limiting factors can be top down or bottom up. Nitrogen and phosphorus cycles (HL ONLY) C.6 Nitrogen-fixing bacteria convert atmospheric nitrogen to ammonia. Rhizobium associates with roots in a mutualistic relationship. In the absence of oxygen denitrifying bacteria reduce nitrate in the soil. Phosphorus can be added to the phosphorus cycle by application of fertilizer or removed by the harvesting of agricultural crops. The rate of turnover in the phosphorus cycle is much lower than the nitrogen cycle. Availability of phosphate may become limiting to agriculture in the future. Leaching of mineral nutrients from agricultural land into rivers causes eutrophication and leads to increased biochemical oxygen demand. Option D: Human Physiology—15 Hours for SL and HL Subtopic Subtopic Number IB Points to Understand Human nutrition D.1 Essential nutrients cannot be synthesized by the body, therefore they have to be included in the diet. Dietary minerals are essential chemical elements. Vitamins are chemically diverse carbon compounds that cannot be synthesized by the body. Some fatty acids and some amino acids are essential. Lack of essential amino acids affects the production of proteins. Malnutrition may be caused by a deficiency, imbalance or excess of nutrients in the diet. Appetite is controlled by a centre in the hypothalamus. Overweight individuals are more likely to suffer hypertension and type II diabetes. Starvation can lead to breakdown of body tissue. Digestion D.2 Nervous and hormonal mechanisms control the secretion of digestive juices. Exocrine glands secrete to the surface of the body or the lumen of the gut. The volume and content of gastric secretions are controlled by nervous and hormonal mechanisms. Acid conditions in the stomach favour some hydrolysis reactions and help to control pathogens in ingested food. The structure of cells of the epithelium of the villi is adapted to the absorption of food. The rate of transit of materials through the large intestine is positively correlated with their fibre content. Materials not absorbed are egested. Functions of the liver D.3 The liver removes toxins from the blood and detoxifies them. Components of red blood cells are recycled by the liver. The breakdown of erythrocytes starts with phagocytosis of red blood cells by Kupffer cells. Iron is carried to the bone marrow to produce hemoglobin in new red blood cells. Surplus cholesterol is converted to bile salts. Endoplasmic reticulum and Golgi apparatus in hepatocytes produce plasma proteins. The liver intercepts blood from the gut to regulate nutrient levels. Some nutrients in excess can be stored in the liver. The heart D.4 Structure of cardiac muscle cells allows propagation of stimuli through the heart wall. Signals from the sinoatrial node that cause contraction cannot pass directly from atria to ventricles. There is a delay between the arrival and passing on of a stimulus at the atrioventricular node. This delay allows time for atrial systole before the atrioventricular valves close. Conducting fibres ensure coordinated contraction of the entire ventricle wall. Normal heart sounds are caused by the atrioventricular valves and semilunar valves closing causing changes in blood flow. Additional HL Human Physiology Topics—10 More Hours for HL Hormones and metabolism (HL ONLY) D.5 Endocrine glands secrete hormones directly into the bloodstream. Steroid hormones bind to receptor proteins in the cytoplasm of the target cell to form a receptor–hormone complex. The receptor–hormone complex promotes the transcription of specific genes. Peptide hormones bind to receptors in the plasma membrane of the target cell. Binding of hormones to membrane receptors activates a cascade mediated by a second messenger inside the cell. The hypothalamus controls hormone secretion by the anterior and posterior lobes of the pituitary gland. Hormones secreted by the pituitary control growth, developmental changes, reproduction and homeostasis. Transport of respiratory gases (HL ONLY) D.6 Oxygen dissociation curves show the affinity of hemoglobin for oxygen. Carbon dioxide is carried in solution and bound to hemoglobin in the blood. Carbon dioxide is transformed in red blood cells into hydrogencarbonate ions. The Bohr shift explains the increased release of oxygen by hemoglobin in respiring tissues. Chemoreceptors are sensitive to changes in blood pH. The rate of ventilation is controlled by the respiratory control centre in the medulla oblongata. During exercise the rate of ventilation changes in response to the amount of CO2 in the blood. Fetal hemoglobin is different from adult hemoglobin allowing the transfer of oxygen in the placenta onto the fetal hemoglobin. Practical Scheme of Work You also need to complete experiments and experimental reports as a part of any IB Science course. For SL, there is 40 hours of material. For HL, there is 60 hours of material. Here are the activities: Practical activities: 20 hours for SL and 40 hours for HL Lab work in class counts towards these hours Individual investigation (internal assessment-IA): 10 hours for SL and HL A lab project along with a report that counts as 20% of your IB exam scores (written exam counts for the other 80%) Group 4 Project: 10 hours for SL and HL Students are separated into groups and must conduct an experiment and write a report. Experiments may not be this cool. What's Next? Thinking about taking AP Biology instead? Learn what's covered in a AP Bio here. Looking for more in-depth explorations of the topics mentioned on this syllabus? Read our subject-specific articles on topics varying from the photosynthesis equation to homologous and analogous structures to cell biology (including cell theory, enzymes, and how the cell membrane and endoplasmic reticulum work). Are you hoping to squeeze in some extra IB classes? Learn about the IB courses offered online. Studying for the SAT? Check out our complete guide to the SAT. Taking the SAT in the next month? Check out our guide to cramming. Not sure where you want to go to college? Check out our guide to finding your target school. Want to improve your SAT score by 160 points or your ACT score by 4 points? We've written a guide for each test about the top 5 strategies you must be using to have a shot at improving your score. Download it for free now: