

International Baccalaureate Advanced Biology 1 Curriculum Map

Month	Content/Unit	Essential Question	Materials	Skills	ESLRs/ IB Standards	Assessment
August	Course Syllabus Review Study Skills	<ul style="list-style-type: none"> • How do I take Cornell notes and organize my Notebook? 	SQ3R Method of Reading and Studying	Read and take notes from technical sources	IB Standards ESLR 5.4	
		<ul style="list-style-type: none"> • How do I use web resources to help me learn? 	Cornell Form Cornell Sample Website for Adv Bio I	Take notes in Cornell Syle Download and use online sources of notes		
		<ul style="list-style-type: none"> • What are the methods of science? How do we answer questions? • How do I write a lab data book entry? 	Data Book format Lab Thin Layer Chromatography of Caffeine	Determining caffeine concentrations by comparing known and unknown samples on a TLC plate.		Lab Databook Writeup
	Safety Rules	What new Safety Issues will I face?	Safety Handout	Evaluate safe lab practices		Safety Quiz

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	Themes of Biology	What are the major concepts covered in Biology?	Themes PPT Pres			
Sept	Basic Chemistry	<ul style="list-style-type: none"> • What fundamental chemical principles do I need to know in order to learn about living things? • What are most abundant elements in living things? What role do they play in a plants and animals? 	<ul style="list-style-type: none"> • Basic Chemistry PPT 	Inferring pH based on comparing known and unknown solutions.	IB Standards: 3.1.1,3.1.2, 3.1.3	<ul style="list-style-type: none"> • Quick Write: What are Buffers? Correct at home. • Quiz on atomic structure • Exam on Themes and Basic Chemistry
	Water and It's Properties	<ul style="list-style-type: none"> • Give one role for sulfur, calcium, phosphorus, iron and sodium in Plants, Animals and Prokaryotes <p>How does hydrogen bonding generate water's unique properties? What are the thermal, cohesive, and solvent Properties of water</p>	Water PPT HPLC Lab	Separation of substances in Koolaid by polarity.	3.14 3.15	Lab Databook writeup

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	Biochemistry	What is the relationships between the properties of water and the uses as a coolant, medium for reactions, and transport?	Lab on Properties of Water		3.16 Design, Aim 7	Lab Report
		What are the four major organic molecules? Identify the structure of each	Biochem PPT Whiteboards	Drawing chemical structures	3.2.1,3.2.2, 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.5	Quiz on Functional Groups
		What are three examples of Mono, Di and Poly Saccharides?			3.2.3	Quiz on Saccharides
		What are one example of a function of; glucose, Lactose, and Glycogen in animals and fructose, sucrose and cellulose in plants? What are the 4 levels of protein structure and the significance of each? What is the significance of polar and non-polar amino acids?			3.2.4 7.5.1 7.5.3	Quiz Remotes

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		What are four functions of Proteins			7.5.4	
		What are differences between fibrous and globular proteins? Give two examples of each	Lab Protein Determination by Bradford test.		7.5.2	
		What are three functions of Lipids? What is the difference in energy storage of Lipids and Carbohydrates?		Generating a Standard Curve and comparing unknowns to that curve.	ESLR 3.3 3.2.7 3.2.6	Quiz on Organic Structures (4 major Monomers)
				Use of a spectrophotometer		Lab Databook writeup
		How do fundamental molecules link together to form polymers and how are they broken apart?	Whiteboards	Linking two molecules together via condensation.	3.2.5 7.4.5	
		How are they broken apart by digestion?		Breaking molecules apart by Hydrolysis		Exam on Water and Biochemistry
October	Cells	Outline the cell theory And give evidence	Cell PPT		2.1.1 2.1.2	
		What are the differences between		Measuring under microscope,	2.3.4	

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		prokaryote and eukaryote cells?	Lab on eukaryote cells (three stains)	drawing	2.1.4	
		What are the types of microscopes used to study cells?			2.1.5	
		What are the relative sizes of molecules, membranes, viruses, bacteria, organelles and cells?		Estimating size based on reference or distance across field of view.	2.1.4	
		What are the major organelles in eukaryote cells and what are their functions?	Lab on prokaryote cells with Gram Staining and Streak Plating	Differentiating between Gram Pos and Neg Bacteria by Gram Staining		Quiz on organelle function.
		Draw and annotate E.coli ultrastructure with their functions	Concept mapping of cell and organelle parts	conceptual mapping	2.2.1 2.2.2 2.2.3	Lab report: databook on comparing eukaryote and prokaryote cells
		Draw and label a diagram of the ultrastructure of a liver with annotated functions.			2.3.1 2.3.2 2.3.3	
		What are three differences between plant and animal cells?			2.3.5	
		What are two roles of extracellular components?			2.3.6	Exam Cells

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Nov	Membranes: Osmosis and Diffusion	What are the components of a cell (plasma) membrane? Explain how phospholipids help maintain membrane structure.	Membranes PPT Whiteboards	Draw and Label a Fluid Mosaic Model of a cell membrane	2.4.1 2.4.2 2.4.3	Quiz on drawing and labeling the plasma membrane.
		Compare Osmosis and Diffusion		Deduce the direction that osmosis and diffusion of solute will occur.	2.4.4	
		What effect does SA/V have on rate of diffusion?	SA/V lab	calculating SA/V, graphing, determining % diffusion error bars, Mean and SD	ESLR 1.1 2.1.6	lab report: SA/V
		How can you determine solute concentration in cells?	Potato osmosis and diffusion lab	graphing, inferring, using balances, making molar solutions.	DCP, CE ESLR 4.1	Lab report: Potato osmosis
		What is the differences between active and passive transport? Facilitated and regular diffusion? What are the functions of membrane proteins?	Hypotonic, Hypertonic and Isotonic Determination practice.	Compare and Contrast Passive vs. Active transport	2.4.3 2.4.5 2.4.6	

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	Enzymes	What are methods of taking material from the outside of a cell to the inside if you are larger than small molecules?		Compare the three major methods of endocytosis.	2.4.7 2.4.8		
Dec		What is the active site?	Enzymes and Energy PPT	inferring, graphing, experimental design	Design Lab ESLR 2.1/2.2/2.3	Lab report on enzyme (databook) and technical report on enzyme function	
		What is the induced fit Hypothesis?	Lab on Enzyme function		7.6.2 3.6.1 3.6.2		Quiz on factors that effect enzyme function
		What gives enzyme-substrate specificity?	Enzyme Lab Pres Pointers			3.6.4	PPT Presentations Rubric assessment
		What is denature mean?					
		What are the uses of lactase in the production of lactose-free milk?				3.6.5	
	Why do enzymes occur in pathways?				7.6.1		
	How do enzymes lower activation energy?				7.6.3		

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Jan	Cell Repiration	What are differences between competitive and non-competative inhibition?	Cell Resp PPT	Diagram the three major steps in Cell Resp	7.6.4	Exams Enzymes
		How can the end product control a metabolic pathway? Include Allosteric Regulation.			7.6.5	
		What are the three major parts of cell respirationi?			3.7.1	
		What role does oxidation and reduction play in cell resp?			3.7.2	
		What are the products of Glycolysis?			8.1.1 3.7.3	
What role do the anaerobic pathways have if they make now ATP themselves? How do the aerobic pathways yield ATP?	Lab on Rate of Fermentation	Design, DCP, CE ESLR 4.2/4.3	3.7.4 8.1.4 8.1.5	Quiz Mitochondria Structure Quiz Glycolysis Quiz Krebs Quiz Chemiosmosis Lab report: Factors that effect Fermentation		

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Feb	Photosynthesis	What is the structure of a mitochondria?	Photo PPT		8.1.3 8.1.6	Exam Cell Resp
		How does a plant harvest the sun's energy?			3.8.1	Lab report: photosynthesis
		What is the structure of a chloroplast?			8.2.1 8.2.6	Quiz Chloroplast Structure
		What wavelengths of light does photosynthesis target?			3.8.2	
		What are the pigments involved in the light reactions?			3.8.3	Light Reaction Quiz
		What is the difference between absorption and action spectra?	Lab: Spectral analysis of chlorophyll using Spectrophotometer or Calorimeter.	Produce the Absorption Spectra of Chlorophyll Extract using a Spectrophotometer	3.8.4 8.2.7	
		How does the plant convert light energy into chemical energy?			8.2.2 8.2.3 8.2.4 8.2.5	
		What could you measure to monitor the rate of photosynthesis?	Lab Rate of Photo		3.8.7	
	How has the plant adapted to harvest	Whiteboards				

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		light?						
	Mitosis	What effect does temperature, light intensity, CO2 have on rate of photo?	Slides of Allium Miotsis Whitefish Blastula	Identification of Stages of Mitosis	3.8.8 8.2.8	Exam Photosynthesis		
		What is the cell cycle? What happens in the cycle? What is cancer? What are the major events that occur in the four stages of mitosis? What is mitosis used for?			2.5.1 2.5.3 2.5.2 2.5.4 2.5.5	Quiz Remotes, Stages of Mitosis		
		How does animal and plant mitosis compare?			Mitosis PPT Lab Mitosis	Compare animal and plant mitosis	2.5.6	Lab report: mitosis
		How long is the cell cycle and how much time does a cell spend in each stage of mitosis?				Estimate the time each stage of mitosis takes using prepared slides.		
March	Meiosis	How does Meiosis reduce the number of Chromosomes in the cell?	Meiosis PPT	Compare and Contrast Mitosis and Meiosis and their outcomes.	4.2.1			
		What are the	lab gametogenesis	Compare meiosis in				

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		differences and similarities between male and female meiosis		men and women.		
		What are homologous chromosomes? What are the steps in meiosis I and II?	Poster Project	Start with 3 pairs of chromosomes and follow them until the end of Meiosis	4.2.2 4.2.3 10.1.1 10.1.2 10.1.3 10.1.4 10.1.5 4.2.4	Poster Evaluation
		How does Mendel's law of Independent Assortment Apply? What is non-disjunction and how can it lead to a different number of chromosomes (downs syndrome) What is a karyotype and how do you interpret one? What is amniocentesis and Chorionic Villus Sampling?	Lab Karyotyping of HeLa Cells		4.2.5 4.2.7 4.2.6	
April	Mendelian Genetics	Define genotype, phenotype, dominant allele, recessive allele, codominant allele, locus, homozygous,	Mendelian Genetics PPT Lab Genetic Corn	Calculate Chi Squared for both Monohybrid and Dihybrid Crosses.	4.3.1	Exam on Mitosis and Meiosis

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		heterozygous, carrier and test cross				
		How do you determine genotypes and phenotypes of the offspring of a monohybrid and dihybrid crosses	Worksheet on Mendelian Genetics	Determine phenotypic and genotypic ratios for monohybrid and dihybrid crosses.	4.3.2 10.2.1	
		What are multiple allele traits?			ESLR 1.2 4.3.3 4.3.4	
		How do you construct a pedigree?	Homework assignment: family pedigree	Construct a Pedigree of your family back to your grandparents.	4.3.12	
		What are the differences between autosomes and sex chromosomes? How do sex chromosomes control gender?			10.2.2 4.3.5 4.3.9	
		What are X-Linked traits? How can color blindness and hemophilia be inherited?			4.3.8 4.3.11	

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April	Chromosomal Inheritance	What are polygenetic traits?	Chromosomal Inheritance PPT		10.3.1	Exam Mendelian Genetics
		What are two examples human polygenetic inheritance?			10.3.2	
		What are chromosomes made of?			4.1.1	
		What are the definitions of gene, allele, and genome?			4.1.2	
		What is a gene mutation?			4.1.3	
		What are translocations?		Outline the types of mutations and their outcomes.	10.2.3	
		How can you map genes by percentage cross over?	HeLa Karyotyping Lab	Map three genes on a chromosome using cross over information.	10.2.5	Lab writeup: Karyotyping
What are linked genes?	Worksheet on Gene Mapping			4.3.7		
How can you identify offspring that are recombinants in a dihybrid cross?				10.2.4		
					10.2.6	

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May	DNA Replication	What are the enzymes and steps involved in replicating the DNA of a prokaryote cell	DNA Rep PPT	Outline the steps in copying DNA.	3.4.1 3.4.2 3.4.3	Parent Interaction form: DNA Replication
		What direction does DNA replication take place?	Whiteboards Animations on THS ADV BIO website		7.2.1 7.2.2 7.2.3	Quiz DNA Replication
	Protein Synthesis	Compare DNA and RNA structure. What are the stages of protein synthesis in prokaryote cells?	Protein Synthesis PPT Whiteboards		3.5.1 3.5.2 3.5.4 7.3.1 7.3.3 7.4.1 7.4.2 7.4.3 7.4.4 7.4.6	Parent Interaction Form: Protein Synthesis
		What are proteins used for that are produced on bound vs free ribosomes in a cell? What is the genetic code? What are codon's and	DNA interactive	Compare prokaryote and eukaryote	7.4.7	

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		anticodons?	DVD	ribosomes.		
	DNA Technologies	What is a frame-shift mutation and it's relationship between sickle cell anemia?			4.1.4	Exam DNA Replication and Structure
		What is the relationship between one gene and one polypeptide?			3.5.5	
		What are introns and exons?			7.1.5 7.3.4	
		What is the difference between sense and antisense strands?			7.3.2	
		What are restriction enzymes?	DNA and Biotech Notes		Micropipetting, DNA digest setup, gel electrophoresis, determining base pair length via semi-log graphing	
		How does electrophoresis work?	DNA Restriction Analysis			
		How can electrophoresis play a role forensics and paternity testing?			4.4.3 4.4.4 4.4.5	
		How can we sequence DNA using terminating nucleotides?	Sanger DNA sequencing simulation	Determine the sequence of a piece of DNA using the Sanger Simulation.	ESLR 5.4	Summary of DNA Sequencing

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		What are three outcomes of the sequencing of the human genome?		Outline how Sanger Sequencing works and explain why 4 different lanes were needed before colored tagging.	4.4.6	
		When genes are transferred between species, what is actually transferred?			4.4.7	Lab Report
		What is a technique for transferring genes using plasmids?	Bacterial Transformation Lab		4.4.8	
		What is recombinant DNA technology?			4.4.8	
		What are two examples of current uses of GMO crops?			4.4.9	
		What are the potential benefits and possible harmful effects of one example of GMO?			4.4.10	
		What is a clone?			4.4.11	

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		How do you clone using differentiated animal cells?			4.4.12	
		What are ethical issues with therapeutic cloning of humans? Creation of embryos for supply embryonic stem cells			4.4.13	
		What are pluripotent and totipotent stem cells?			2.1.9	
		What is a therapeutic use of stem cells ?	Posters for Stem Cells Pro's and Con's		2.1.10	Exam DNA Tech