

# **Biotechnology**

## **CAA Syllabus**

*Human Heredity: Principles and Issues* by Cummings

Day	Time	What	How
1	Morning	Setting the Stage  Problem Solving in Science: The Scientific Method Lab Safety Protocol <b>Lab # 1 Introduction to the Microscope</b>  Review of Cell Structures	Hijacking Mystery  The Hijacking Mystery  Class discussion and OH Care and usage of binocular microscopes  Group Activity – Access Prior knowledge
	Afternoon	Pre Assessment  Class Discussion of Cell Parts Cell Theory  Autodigestion & Cell part	Pre-test  PowerPoint & discussion guide w/handout  <i>Journal Entry #2 – Personal            Response</i>
	Study Hall	Endosymbiont Theory  Name That Organelle  Directed Reading: Chapter 1 and questions  Origin of Eukaryotic Cells – Article	PowerPoint  Whiteboard review of Cell function  Personal Response JE # 3  Decorate a cell cake
2	Morning	<b>What is a chromosome?</b> <b>Lab # 2 Chromosomes &amp; Genes (examination of Drosophila Salivary gland slides)</b> Teacher Modeled Lab Report  Introduction to Mitosis Cell Cycle	Pre-Lab Discussion of Chromosomes ⇒ Structure ⇒ Function ⇒ Types How to make biological drawings  PowerPoint, class discussion; handouts Video & guide sheet
	Afternoon	Meiosis  Differences between mitosis & meiosis	Class discussion “Why can’t mitosis work for humans?” Video: Meiosis: Key to Genetic Diversity & guide sheet
	Study Hall	Lab Reports Lab # 1 and # 2 Review	Lab notebooks Mitosis & Meiosis handouts DRA pp. 24 – 38; p. 39 # 3, 16, 21, & 28

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3	Morning	Introduction to Gel Electrophoresis <b>Lab # 3 DNA Extraction</b>	PowerPoint/Class discussion/Handout Edvotek: Isolation & Extraction of DNA from <i>E. coli</i> DRA & guide questions
		Introduction to Gel Electrophoresis	<b>Lab # 4 - Separating Dyes with Electrophoresis” (Wards)</b>
	Afternoon	DNA – An Introduction CD and writing assignment  Assign Genetic Disorder Topics	Class Discussion and PowerPoint Journal Entry # 3  Directed Reading pp. 178 – 193 p. 195 # 1, 3, 9, 10, 11, 12, 13, 15 Handouts on DNA and replication Challenge Vocabulary
4	Study Hall	The Double Helix – Race for the Discovery (Video)  Ethics of Watson & Crick Discovery	Video Guide Questions  JE # 5
	Morning	Determination of DNA Mutations in Genetic Disorders  Transcription  Translation and Protein Synthesis	<b>Lab 5: Sickle Cell Anemia Detection by Gel Electrophoresis</b>  Class notes and Clint Eastwood Activity  PowerPoint/Notes/Handouts Mission Impossible/Stars Wars Protein Synthesis Activity  Directed Reading and guide questions
	Afternoon	Completion of Translation/Protein Synthesis	Handouts and class discussion
	Study Hall	Genetic Disorder Research Project	Discussion of Research Project Computer Lab

Day	Time	What	How
5	Morning	Question & Answer Session  Warm Up  Chromosomal Mutations <ul style="list-style-type: none"> <li>⇒ Insertions</li> <li>⇒ Deletions</li> <li>⇒ Translocation</li> <li>⇒ Repetitions</li> </ul> Detection of mutations by DNA Sequencing and interpretation of significance on protein formed	Class discussion  Student handout and discussion  Class discussion/OH Presentation & textbook references  <b>Lab# 6: DNA Sequencing</b>
	Afternoon	Ethical Dilemma: Video: GATTACA	Joint activity with second biot section Writing response on one of the dilemma and student personal response
	Study Hall	Genetic Disorder Projects	Computer Lab
6	Morning	Completion of Chromosomal Mutations  DNA Mutations and Repair Mechanism  Patterns of Inheritance Mendelian Genetics Mono & dihybrid crosses Incomplete dominance Multiple Alleles Genetics of Blood Groups Gene Mapping Probability	OH/Class discussion & outline completion  Video: Patterns of Inheritance Class discussion Practice Genetic Problems – teacher led and student worksheet
	Afternoon	Observation of types of inheritance	<b>Lab # 7: Human Heredity</b> <b>Lab #89: A Lab on the Inheritance of Blood Types</b>
	Study Hall	Computer Lab	Work on Genetic Disorder Project
7	Morning	Warm Up Introduction to Cloning Weird AI Lightning bugs & tobacco Plants Lab Transformation	How to Clone a Gene <b>Lab # 9 Transformation of GFP gene into E. coli and turn on the gene with the use of arabinose</b>

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	Afternoon	Palindromes Restriction Enzymes: Types, Purpose, & uses	Class Discussion <b>Lab # 10 DNA Scissors</b> <b>Lab</b> Restriction Enzyme Digest (BIO-RAD)
	Study Hall	Computer Lab	Genetic Disorder Research & completing Power Points
8	Morning	Check Bacteria Plates  The Case of Nathaniel Wu  Genetic Engineering Projects Debate Topics	Ethical analysis of hiring of person with Huntington's Disease  Assign Topics
	Afternoon	PCR D Q Alpha 1  The Innocence Project	Video on Sam Sheppard Trial Class discussion
	Study Hall	Lab Completion Textbook Reading on PCR	
9	Morning	Presentation of Genetic Disorder Projects PCR Cont.	Power Point Presentations  <b>Lab # 12 PCR</b>
	Afternoon	<b>Lab13 Green Fluorescent Protein Lesson 1</b> (BIO-RAD)	Evaluation of Transformation Plates to set up GFP Labs
	Study Hall	Review Begin to Prepare for Research Presentations	Directed Reading Individual & group work
10	Morning	Protein Chromatography Cont.  Gene Splicing & Big Business  Ethics: Letter to friend re: taking HGH	<b>Lab # 13 Lesson 2 GFP</b>  OH & discussion  Writing Prompt
	Afternoon	Genetic Disorder – ALD	Lorenzo's Oil with Biot B
	Study Hall	Individual Reading and prep for class presentation from text	Genetic Journeys Topics

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11	Morning	GFP lesson 3 Southern Blotting DNA Fingerprinting	Lab GFP cont Class discussion <b>LAB # 14 – Who Committed the Crime? BIO-RAD</b>
	Afternoon	Reading Autorads	<b>Lab # 15 A Paternity Cass</b> <b>Lab # 15 A Criminal Case</b>
		Applications of DNA Science	CNN Review
Study Hall	Lab Notebooks & Corrections	Study Textbook	
12	Morning	Field Trip to Mutter Museum	
	Afternoon	Field Trip to Mutter Museum	
	Evening	Computer Lab – Ethics Debate Issues VIDEO: Scientific American Frontiers: Never Say Die Both Biot sections	
13	Morning	GFP Lesson 4 FORENSICS – RFLP Case Studies Analysis	Read gels from RFLP Lab
	Afternoon	Debate on Controversial Issues	<b>Student Note – taking and discussion of which side was more effective in the debate</b>
14	Morning	Controversial Research Complete all work	Student Small Group Presentations
		Lab Corrections Tools of A Genetic Engineer	Students - Catch Up  Students will insert a HGH gene into a plasmid
	Afternoon	<b>Lab # 17 Bacterial Sporulation</b>	Lab Anthrax  Discussion of Labs Questions and Answers
Study Hall	Wrap Up on BST in Milk GE/GM foods and labeling SPE	Reading food product labels v Unlabeled foods	
15	Morning	<b>Activity: The Faces of Cancer</b> Both Biotechnology Classes (NIH) Cancer and the Cell Cycle The Two Hit Theory of Cancer Directed Reading: Fighting Cancer with Biotech	<b>OH and class discussion</b> Statistical Data on cancer <ul style="list-style-type: none"> <li>• Types</li> <li>• Age</li> </ul> Life Choices