

HIGH SCHOOL MODULES*

Biotechnology

	Students will...	Skills	Standards	SEPS
Gel Electrophoresis with dyes <i>All levels—60 minutes</i>	Load and run agarose gel	Micropipeting, gel electrophoresis	H.B.1	H.B.1A.3 H.B.1A.4-6
Intro to Techniques: DNA Isolation, PCR, and Analysis <i>Intermediate/Advanced—90 minutes</i>	Isolate own DNA, simulate PCR and analyze results	Micropipeting, DNA isolation, PCR, gel electrophoresis	H.B.1, H.B.2 AP 3.A	H.B.1A3, H.B.2A.1 3.A.1
Detecting GMOs <i>Basic—60 minutes Expanded—90 minutes (PCR set-up)</i>	Confirm successful DNA recombination with gel electrophoresis	Micropipeting, DNA isolation and amplification, gel electrophoresis	H.B.1, H.B.2 AP 3.A	H.B.1A.1, 3, 4 and 7 H.B.2A.1, AP 3.A.1
Microarray -Cancer: determining gene expression <i>Advanced—60 minutes</i>	Simulate a microarray test to examine gene expression profiles	Cytogenetics, microarray	H.B.1, H.B.2, H.B.4 AP 3.A	H.B.1A.3, 4, and 7, H.B.2A.1, H.B.2D.3, H.B.4B.2, AP 3.A.4
Karyotypes and Genetic Disorders NEW! <i>Intermediate / Advanced—90 minutes</i> <i>*Can be modified for CP level classes with background in chromosomes</i>	Review clinical information to construct a diagnostic karyotype	Use of microscopes, karyotype boards and genetic websites	H.B.1, H.B.4, AP 2.E	H.B.1A.3, H.B.4B.2, H.B.4D.1, AP2E.1, 2E.2

Forensics

Bobby Dunbar mystery NEW! <i>Basic/Intermediate -60 minutes</i>	A case of questionable identity – based on a true story	Micropipeting, gel electrophoresis	H.B.1	H.B.1A.1, 3, and 6
The Atlanta murder mystery NEW! <i>Intermediate- 90+ minutes</i>	Solve a perplexing mystery that is based on a true event	Micropipeting, gel electrophoresis and fingerprint analysis	H.B.1	H.B.1A.1, 3, and 6
Characteristics of Inheritance: Blood Types <i>Intermediate/Advanced—90 minutes</i>	Conduct testing to determine the blood types of four surgical patients	Micropipeting, antigen/antibody	H.B.1, H.B.2 and 4 AP 3.A	H.B.1A3, H.B.2A.1, 3.A.
Forensics Chemistry: Was it really the flu? <i>Basic/Intermediate- full 60 minutes</i>	Determine purity of sports drinks using basic principles of electromagnetic spectrum	Micropipeting, spectrometry	H.B.1, H.B.4	H.B.1A1, 3, 4 H.B.4B.2

Medical Genetics

Mystery of the Crooked Cell <i>Intermediate—60-90 minutes</i>	Test human hemoglobin to diagnose sickle cell disease and trait	Micropipeting, gel electrophoresis	H.B.1, H.B.4	H.B.1A.1, 3; H.B.4A.1, 4D.1, 4B.2
Mad Cow Disease—Prions <i>Basic— 60 min, Intermediate—90 min (PCR)</i>	Determine which company is illegally using cattle tissue in animal feed	Micropipeting, DNA amplification via PCR, gel electrophoresis	H.B.1, H.B.2 AP 3.B	H.B.1A3, H.B.2B.2, AP 3B.2
Name That Disorder <i>Intermediate / Advanced —60 minutes</i>	Diagnose a genetic disorder using multiple biochemical tests	Chemical analyses of unknowns	H.B.1, H.B.2, H.B.4, AP 3.A, 3.C	H.B.1A.3, 4, 6; H.B.2A.1, H.B.2B.1, H.B.4B.1, 2; AP 3.A.3, 3.C.1
A Cancer Family Tree <i>Advanced—90 minutes</i>	Diagnose Li-Fraumeni syndrome through pedigree analysis and gene testing	Micropipeting, gel electrophoresis	H.B.1, H.B.2, H.B.4 AP 3.A	H.B.1A.1, 3, 4; H.B.2D.2,3; H.B.4A.1, H.B.4B.2, H.B.4D.1, Z, AP 3A.1-4
What's My Genotype? <i>Advanced—4-5 hours (modified version available)</i>	Determine students genotype for PTC paper phenotype	Micropipeting, DNA isolation and amplification, gel electrophoresis	H.B.4, AP 3.A	H.B.4A.1,2; H.B.4B.2; AP3.A.2,3
Be the Geneticist <i>Advanced—60-90 minutes</i>	Diagnose a variety of patients using photographs, clinical descriptions and databases	Use of clinical databases	H.B.1, H.B.4, AP 2.E	H.B.1A.3, H.B.4B.2, H.B.4D.1, AP 2E.1, 2E.2
X-L Inheritance—Rett Syndrome <i>Advanced—2 hours</i>	Test PCR products to diagnose Rett syndrome	Micropipeting, PCR, gel electrophoresis, and Sanger sequencing	H.B.1, H.B.4 AP 3.A	H.B.1A.3, H.B.4B.2, H.B.4D.1 AP 3A.2,3,4
You Are What you Eat—The Folic Acid Story <i>Advanced—90 minutes</i>	Test various food samples for folic acid content. Aligns with GGC work on neural tube defects	Bradford Assay, spectrometry, standard curve creation and analysis	H.B.1, H.B.2, H.B.4, AP2.E, 4.B, 3.A	H.B.1A.3, 4, 5; H.B.2A.1; H.B.4B.2; H.B.4D.1; AP 2.3.1, 2;3.A; 4.B.1
Mitochondrial DNA Analysis <i>Advanced—3-4 hours</i>	Isolate and analyze two specific regions of mitochondrial DNA	Micropipeting, DNA isolation, PCR, and gel electrophoresis	H.B.2, H.B.4, AP 2.A, 2.B, 3.A, 3.B	H.B.2B.1; H.B.4B.2; AP2.A.1,2.B.1; 3.A.4; 3.B.2
'Vampires', madness or genetic disorder? NEW! <i>Intermediate / Advanced—90 minutes</i>	Examine red blood cells and sequence analysis to diagnose porphyria	Micropipeting, spectrometry, and chromatogram analysis	H.B.1, H.B.4, AP3.A	H.B.1A,3,4 AP3A.2,3,4