

## DNA Learning Center NYC at City Tech High School Lab Field Trips 2019-2020

### BIOTECHNOLOGY:

These experiments, which are required for AP Biology students, introduce key methods for manipulating DNA and transferring genes between living organisms.

#### Bacterial Transformation\*

Lab time: 2½ hours

This experiment illustrates the direct link between an organism's genetic complement (genotype) and its observable characteristics (phenotype). Students genetically engineer the bacterium *E. coli* to uptake genes for antibiotic resistance and bioluminescence. Following overnight incubation, transformed bacteria are compared to unexposed bacteria for their ability to grow in the presence of ampicillin and fluoresce.

#### DNA Restriction Analysis\*

Lab time: 3½ hours

This experiment demonstrates that DNA can be precisely manipulated and that it behaves as predicted by the Watson-Crick structure. Students use restriction enzymes to cut DNA and analyze the resulting DNA fragments by agarose gel electrophoresis. Photographs of students' results are posted on the Harlem DNA Lab web site.

### HUMAN DNA VARIATIONS:

These experiments allow each student to safely prepare a sample of DNA from their own cheek cells and use polymerase chain reaction (PCR) to analyze different regions of their own DNA.

#### Human DNA Fingerprinting: Genotyping a Human "Jumping Gene"+

Lab time: 4 hours

This experiment detects the presence or absence of a transposon on chromosome 16. Students amplify the polymorphic region from their own DNA, use gel electrophoresis to generate their molecular genotypes and use class data to study population genetics, Hardy-Weinberg equilibrium, and theories of human evolution.

#### Human Mitochondrial Sequencing+

Lab time: 4 hours

This lab examines Single Nucleotide Polymorphisms (SNPs) in the human mitochondrial genome. Students amplify a small region of their own mitochondrial DNA and use the product as a template for DNA cycle sequencing. The students obtain their "finished" sequence and perform computer analysis of the data using the DNALC's online bioinformatics tool Sequence Server.

\* DNA Restriction Analysis and Bacterial Transformation labs are required by the Educational Testing Service as part of the Advanced Placement Biology Curriculum.

+ Participation in this laboratory requires a signed consent form (provided by the DNALC) from the parent/guardian of each student younger than 18 years of age, and is only for students in 10th, 11th and 12th grades.

### RESERVATION DETAILS

- Cost is \$25 per student per lab; there is a minimum charge of \$500 per lab for 20 students or less.
- Scholarship funds are available for qualified classes: inquire when you call.
- Unless other arrangements have been made in advance, all labs begin promptly at 9:30 AM.
- Classes cancelled less than one month prior to the scheduled date will not be permitted additional visits.
- **For reservations, please contact: Mary Lamont at (516) 719-1296.**