Grade 12

DNA extraction & gel electrophoresis

Students will understand the genetic basis of disease and how scientists use DNA and gene modification to learn about disease at the cell level.

BIOlab Experiences Students will isolate DNA from transgenic lab bacteria and perform an enzymatic digest and gel electrophoresis to isolate the jellyfish gene for green fluorescent protein.

Time required
Full day (4h)

Grade 12 students learn the structure and function of DNA in protein synthesis. Investigating changes in protein synthesis resulting from disease is an important way basic medical scientists understand the mechanisms of disease and determine drug targets or treatment options. Gene modification and potential treatments involving genome editing could be the future of medicine for today's students. Students will get hands-on experience in basic techniques working with DNA.

Specific Learning Outcomes Addressed		What students will experience in the BIOlab
B12-1-03	Distinguish between genotype and phenotype, and use the terms appropriately when discussing the outcome of genetic crosses.	Students are introduced to the concept of a "disease phenotype" at a cellular level.
B12-2-06	Outline the steps involved in protein synthesis.	Using cell model students are shown that genes code for proteins which give characteristics to cells.
B12-2-09	Investigate an issue related to the application of gene technology in bioresources.	Students will be introduced to the use of transgenic lab bacteria for protein synthesis in medicine, and in basic research investigating protein changes in disease.
B12-2-10 B12-2-07	Investigate an issue related to the application of gene technology in humans. Relate the consequences of gene mutation to the final protein product.	Students are introduced to concept of transgenic organisms and the capacity for genes to be read by any organism including humans. The potential ability to treat diseases like cystic fibrosis resulting from point mutations with new genome editing technologies like CRISPR-Cas9 are discussed, including legal and ethical factors contributing to use of this technology.