# UBD Unit Design Template

<table>
<tr><td>Time Frame:</td><td>Unit Title: DNA</td><td>Course Name: Criminology & Forensics</td></tr>
<tr><td colspan="3">Stage 1: Desired Results</td></tr>
<tr><td>Established Goal(s)</td><td colspan="2">Transferable Skills</td></tr>
<tr><td rowspan="4">Competencies and Standards<br><br>NH SS Standards<br><br>SS:WH:12:4.4: Examine the development and impact of medical innovations<br><br>CCSS Standards<br><br>Science Standards<br><br>LS1.A: Structure and Function<br>HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.<br>LS3.A: Inheritance of Traits<br>HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.</td><td colspan="2">Students will be able to independently use their learning to...<br><br>Identify a criminal with DNA evidence during a forensic investigation.</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td><u>Understandings</u><br>Students will understand that...<br><br>DNA structure follows consistent rules common to all living organisms.<br>DNA structure varies between members of a species; for example, from human to human. Nevertheless, biologically related humans will have similar DNA.<br>DNA is currently the most accurate form of identification and/or exclusion available to forensic science.<br>Given that DNA of an individual may share noticeable similarities with relatives, DNA evidence can effectively narrow down a suspect pool even if it does not directly contain a sample of the suspect's DNA.<br>DNA samples/comparison materials can be obtained from both public and private databases</td><td><u>Essential Questions</u><br><br>How is DNA used to solve crimes?<br>What are the ethical considerations surrounding public and private DNA databases?<br>How does the existence of public and private DNA databases affect an individual's right to privacy?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>Students will know...<br><br>DNA molecules are double-stranded. Adenine (A) bases pair with thymine (T); cytosine (C) with guanine (G).<br>DNA is inherited through biological relationships. Therefore, it can be matched to criminals or victims personally, and also via their relatives.<br>DNA can be collected from many types of biological evidence, including hair, blood, and saliva.<br>Polymerase chain reaction (PCR) uses several stages to copy DNA molecules.</td><td>Students will be able to...<br><br>summarize the procedure of PCR and gel electrophoresis to analyze a DNA sample.<br><br>compare DNA samples, after analysis, to identify their sources.<br><br>analyze the historical development of using DNA evidence in criminal prosecutions and exonerations<br><br>evaluate the balance between safety/evidentiary uses and privacy afforded by the availability of genetic information</td></tr>
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| | Gel electrophoresis uses restriction enzymes to cut DNA molecules at particular base sequences (e.g. AAG). Then, the DNA fragments are separated by size using a gel plate. The resulting pattern is unique for each DNA sequence.<br>DNA evidence has been used to both identify victims and suspects in specific criminal cases.<br>Genetic genealogy has assisted in criminal investigations.<br>DNA has exonerated people who have been wrongfully convicted of a crime.<br>The popularity of DNA databases maintained and associated with paid genealogical services has implications for privacy that are still being negotiated. | |