

# Biotechnology Lesson 1:

## Restriction Enzyme Analysis

Subject Area	Biology/Biotechnology
Age or Grade	Juniors/Seniors AP Biology
Estimated Length	3 85 minute Class periods
Prerequisite knowledge/skills	DNA Structure. Basic understanding of enzymes.
Description of New Content	Biotechnology is the technological application that uses biological systems, dead organisms, or derivatives thereof, to make or modify products or processes for specific use. Not only is it important for scientific research but it has become part of our daily lives. Restriction enzyme endonucleases are able to digest or cut DNA at specific sites. These enzymes are used as tools for genetic engineering, mapping genes, and sequencing genomes. Agarose gel electrophoresis can be used to separate DNA of different sizes.
Goals	To introduce the students to biotechnology and allow them to experience molecular biology techniques: principles of restriction digestions and DNA gel electrophoresis, agarose gel casting, sample loading, size-based separation of DNA fragments, and DNA staining.
Materials Needed	<a href="#">Restriction Digestion and Analysis of Lambda DNA Kit</a> Bio-Rad. Gel box, and power source. Micro-pipetmem, and pipette tips.
Procedure	Day 1 Lecture/Discussion: Introduce the students to biotechnology by asking them to define it. After it's been defined ask them to think of examples of biotech that are seen in their daily lives. This should help to give them a better sense of what biotechnology is and how it is important not only for biology but for our daily lives. This should be followed by a short background lecture on restriction enzymes, and

	<p>their function.</p> <p>Day 2 Lab Activity Part 1: Students will use restriction enzymes to cut Lambda DNA. Students should also pour agarose gels that will be used on the third day to analyze the digest.</p> <p>Day Lab Activity Part 2: Students will load and run their cut and uncut lambda DNA samples into an agarose gel and then visualize them. As a thought question students can be asked for reasons why it would be important to cut DNA, and how this could be used as a tool. This could lead to a discussion on restriction fragment polymorphisms, as well as gene cloning and mapping.</p> <p>A detailed procedure can be found in the manual for the kit. <a href="#">Restriction Digestion and Analysis of Lambda DNA Kit</a></p>
Extensions	The biotechnology theme will be extended into the next lab where the students will complete a lab activity involving the bacterial transformation of the pGLO plasmid.
References	Bio-Rad. <a href="#">Restriction Digestion and Analysis of Lambda DNA Kit</a>