#### Foundations of Biotech:

**Complete Genetic Engineering Sequence** 

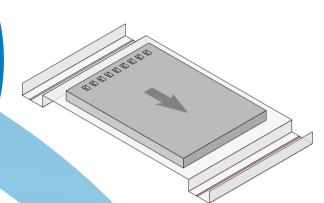
(18-20 class sessions)

## Make Recombinant Plasmid

Use ligase to make recombinant plasmid from DNA fragments.

### **Verify**

Visualize digestion and ligation reaction products using gel electrophoresis.



### **Isolate Gene**

Use restriction enzymes to digest plasmid and isolate gene of interest (Gol).

#### THE BIG IDEA

**DNA** → **Protein** → **Trait** 

DNA contains all the information needed by organisms to survive and reproduce. The information in DNA is translated into proteins, which contribute to the traits of an organism. Altered DNA can result in non-functioning proteins and can lead to genetic disease. Biotechnology research and development can provide functional proteins to patients and alleviate the symptoms of certain diseases. Through the *Foundations of Biotech* labs, students will gain hands-on experience in producing a functional protein from genetically modified bacteria.

# **Produce Protein**

Transform bacteria with recombinant plasmid to produce protein of interest (Pol).

## Use Biotech Tools

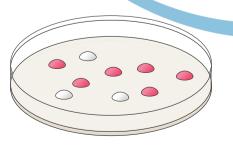
Learn how to use biotechnology lab tools.

## **Purify Protein**

Grow transformed bacteria and purify Pol through column chromatography.

# Verify with Colony PCR\*

Check for presence of Gol in transformed bacteria using PCR.



\* Optional activity



Biotechnology Drug Discovery and Development Process



Scientific Discovery for the Classroom

#### Foundations of Biotech:

**Abridged Genetic Engineering Sequence** 

(16–18 class sessions)

Plasminid is provided

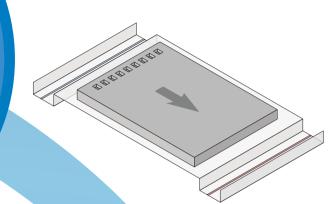
Religion make

Pre-mascombinant plasmid

from DMA

## Verify

**Visualize digestion** products using gel electrophoresis.



### **Isolate Gene**

**Use restriction enzymes to** digest plasmid and isolate gene of interest (Gol).

#### THE BIG IDEA

**DNA** → **Protein** → **Trait** 

DNA contains all the information needed by organisms to survive and reproduce. The information in DNA is translated into proteins, which contribute to the traits of an organism. Altered DNA can result in non-functioning proteins and can lead to genetic disease. Biotechnology research and development can provide functional proteins to patients and alleviate the symptoms of certain diseases. Through the *Foundations of* Biotech labs, students will gain hands-on experience in producing a functional protein from genetically modified bacteria.

### **Produce Protein**

**Transform bacteria with** recombinant plasmid to produce protein of interest (Pol).

## Use **Biotech Tools**

Learn how to use biotechnology lab tools.

## **Purify Protein**

**Grow transformed bacteria** and purify Pol through column chromatography.

**Check for presence of Gol** in transformed bacteria using PCR.



Biotechnology Drug Discovery and Development Process



**AMGEN** Foundation

#### Foundations of Biotech:

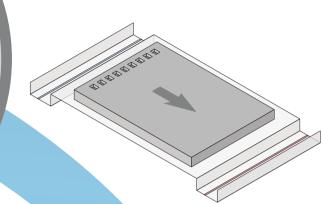
**Focus on Bacteria Sequence** 

(12-14 class sessions)

Make Recombinant Plasmid is provide Live Discombinant plasmid from DNA fragments.

Verify

Visualize digestion and ligation reaction products using gel electrophoresis.



solate Gene

Use restriction enzymes to digest plasmid and isolate gene of interest (Gol).

THE BIG IDEA

DNA → Protein → Trait

DNA contains all the information needed by organisms to survive and reproduce. The information in DNA is translated into proteins, which contribute to the traits of an organism. Altered DNA can result in non-functioning proteins and can lead to genetic disease. Biotechnology research and development can provide functional proteins to patients and alleviate the symptoms of certain diseases. Through the *Foundations of Biotech* labs, students will gain hands-on experience in producing a functional protein from genetically modified bacteria.

## **Produce Protein**

Transform bacteria with recombinant plasmid to produce protein of interest (Pol).

Use Biotech Tools

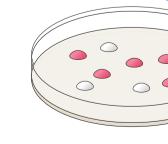
Learn how to use biotechnology lab tools.



Grow transformed bacteria and purify Pol through column chromatography.

Colony PCR

Check for presence of Gol in transformed bacteria using PCR.





Research and Development

Manufacturing





Regulatory Affairs









**AMGEN** Foundation