**Bio111 Week 1**

Before you come to lab:

1) “Why does evolution matter?” Watch 5 minute video to set the stage for a multi-week module on evolution. <http://www.pbs.org/wgbh/evolution/library/11/2/quicktime/e_s_6.html>

2) Answer each of these four questions in two sentences or less.

A) Why does evolution matter on a daily basis?

B) What is a Gram stain?

C) What is synthetic biology?

D) What does the promoter of a gene do?

**Evolution: Antibiotic Resistance (12 week project)**

Learning Objectives

*Skills*

* Pipet correctly.
* Work with bacterial cells with sterile technique.
* Make dilutions of stocks

*Cognitive*

* Employ a scientific approach to answering biological questions and test hypotheses.
* Analyze experimental data and reach logical conclusions.
* Describe the big idea of evolution based on lab experiences.
* Explain how antibiotic resistant bacteria appear in a matter of days.

The first rule of antibiotics is try not to use them, and the second rule is try not to use too many of them. —Paul L. Marino, *The ICU Book*

In Lab:

The entire lab will design an experiment to determine which of these antibiotics is effective on *Escherichia coli* and *Bacillus subtilis*.

ampicillin

tetracycline

chloramphenicol

erythromycin

streptomycin

**Information: Build Your Own Promoter (5 week project)**

Learning Objectives

*Skills*

* Pipet correctly
* Work with bacterial cells with sterile technique.
* Make dilutions of stocks

*Cognitive*

* Employ a scientific approach to answering biological questions and test hypotheses.
* Analyze experimental data and reach logical conclusions.
* Describe the big idea of information based on lab experiences.
* Organize an oral presentation for sharing scientific information with peers.
* Prepare a written summary of experiments designed, performed and analyzed personally.
* Review the information contained within promoters.

In Lab:

1) **A promoter** is the on off switch that governs when a gene is on and when it is off. Promoters are made of DNA, are a component of genes and are located in front of genes. Each group will investigate one of four topics to learn more about promoters. Spend 10 minutes searching the web to find information about your topic. Then spend 5 minutes to prepare a brief definition/description of your term. Take notes on the other 3 terms.

inducer:

repressor:

transcription factor:

ribosomal binding site (RBS):

Give short introduction to synthetic biology (PPT)

2) Synthetic biology is a new field that blends engineering, biology, mathematics, computer science and chemistry. The goal of this field is to design and build biological devices using DNA as the construction material. To prevent others from “reinventing the wheel,” synthetic biologists have produced a collection of DNA parts and a supporting database that you can search online.

From the [registry of standardized DNA parts](http://partsregistry.org/cgi/partsdb/pgroup.cgi?pgroup=Regulatory), find the following promoters:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| name | part number | default state | modifier? | consequence of modifier |
| pOmpC |  |  |  |  |
| pLac |  |  |  |  |
| pBad |  |  |  |  |
| pLux |  |  |  |  |
| pTet |  |  |  |  |
| pLpp |  |  |  |  |
| pT7 |  |  |  |  |
|  | J23100 |  |  |  |