SEED Academy, Spring 2009
Synthetic Biology Module

Homework #1
Due February 21, 2009

1) Go to the course website (http://openwetware.org/wiki/SEED/2009) and find the link to the Synthetic Biology Comic by Drew Endy (under the "Schedule" tab). Read the comic.

2) From the course website, click on the *first* link to the iGEM competition (i.e. the one that is *not* on OWW). Browse the site. Respond to the following:
   a. What is iGEM?
   b. List the names of 3 universities that participated in the 2008 iGEM; list the title/one-sentence description of each project

3) From the iGEM 2006/2007/2008 websites, select just one project from the **scores** of descriptions that is interesting to you. Watch the video of the group presentation (2008: http://ung.igem.org/Results; 2007: http://parts.mit.edu/igem07/index.php/Presentations; 2006: http://igem2006.com/presentations.htm) and read the team's description of the project on their wiki (A wiki is a type of website that is open can be modified by different users. Most of the websites used for this course are wiki format). Prepare a brief summary of the project.

4) Now that you have an introduction to Synthetic Biology, prepare a list of 3-5 specific tasks that you would like to engineer biology to perform. You don't have to know anything about how to do it, or even if it would be possible. Be creative and try to come up with a really diverse list of different applications!

5) Complete the calculations and exercises in the training lab handout.

6) Data Analysis
   a. Plot the data from the dye dilution lab in Microsoft Excel using an xy-scatter (without a line). On the X-axis, plot the concentration of the dye as a fraction of the original sample. On the Y-axis, plot the absorbance of light at 500 nm.

   b. Are there any data points that look unusual (Hint: look around the ends)? Why might these values be misleading? Remove these data points from the plot.

   c. Add several types of trend lines including linear, logarithmic, and exponential. You can add a trend line by right-clicking on the data set and selecting "Add Trendline." For each of these trend lines, display the

equation and R^2 values (options tab). Which type of equation is the best fit for the data and why?

d. Print the graph and tape it into your lab notebook

Pre-Lab for Session #2

1) What units of measure are used on your standard bench top pipette?

2) What does it mean to make a 1% solution (Hint: there are two conventions, one for solid and one for liquid)?

3) How much of a 10X solution and how much water must be combined to make 1 mL of a 1X solution?

4) What is an enzyme?

5) What does a restriction endonuclease do?

6) Does DNA have an electrical charge? If yes, is the charge positive or negative?