EN.580.441/EN.580.641 Cellular Engineering HW #3
Assigned: Sept. 27 **Due: Oct 11**

Matlab Instructions:

In this homework you will reproduce a classic cellular engineering model used to analyze a genetic toggle switch. The article is: "Construction of a genetic toggle switch in Escherichia coli" by Gardner, TS; Cantor, CR; and Collins, JJ. In Nature 403: 339-342, 2000. Some of the code to implement is provided, but you need to add missing pieces to get things to run as well as vary certain parameters. By implementing and perturbing this computational model, you will be able to simulate a genetic switch. Your perturbation is your choice and creativity is encouraged.

Submit via Blackboard:

1. A 1-1.5 page write up (single spaced, 12 pt font, not counting figures) that includes and discusses the following:
   a. Introduction – What was the experiment and why is it important?
   b. Model – What are the biological reactions and how are they implemented as a computational model? What are the assumptions?
   c. Discussion Re: Reproduction of Figure 2 – Include (a), (b), and (d); Explain what your figures show
   d. Discussion Re: Reproduction of Figure 5a – Include 3 curves Explain what your figure shows
   e. Modification(s) to the model – What did you change and why?
   f. Results – What do your perturbations show?
   g. Conclusions – How good is the model? What are its limitations?

2. Plots/graphs (On extra pages after the write-up)
   a. Fig 2a
   b. Fig 2b
   c. Fig 2d
   d. Fig 5a
   e. Between 1-5 additional graphs depending on your perturbation(s)
   f. A figure caption under each graph that fully describes the figure

3. Commented MATLAB code so that the TAs may execute it and read it.