

# CS341 Systems Biology I

## Homework Assignment #1 – Reading (due Tues Sept 12, 2017)

The first goal of this reading assignment is to familiarize you with the aspects of molecular biology used in this course. The second goal of this reading assignment is to introduce you to a systems approach to studying molecular biology.

1. Read “The Universal Features of Cells on Earth” – a section in Ch. 1 of Molecular Biology of the Cell, ed. B Alberts et al., 4/e, 2002. If you are already familiar with molecular biology, then feel free to skim the pages (<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?&rid=mboc4.section.4>)
  - (a) Briefly define the terms
    - i. DNA
    - ii. Gene
    - iii. mRNA
    - iv. protein
  - (b) How are proteins related to DNA? (Use approximately 2 sentences to answer this question.)
2. Read “Computational systems biology” by H Kitano, *Nature*, 2002 (sent as email attachment by Stephanie). Note that he mentions two branches of systems biology – knowledge discovery and simulation. In this course, we will be following the simulation branch.
  - (a) In the second paragraph, he mentions p53 and its role in tumor suppression. This is a good example of a system in which knowing the genome sequence and protein properties are not enough to fully understand the system. Why not?
  - (b) What is robustness?
3. Read “Systems Biology: A Brief Overview” by H Kitano, *Science*, 2002 (sent as email attachment by Stephanie).
  - (a) Briefly explain the ideal model for research in systems biology (i.e. Figure 1). (Answer in approximately 4 sentences.)
  - (b) In what ways can modeling improve the efficiency of biological experimentation?

## Further Reading

More detailed descriptions of transcription and translation can be found in the Alberts book at (<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=mboc4.section.975>) and (<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=mboc4.section.1363>) If you are interested learning more about apoptosis see this section in the Alberts book (<http://www.ncbi.nlm.nih.gov/books/bv.fcgi?rid=mboc4.section.3245>)