TCORE 122D – INTRODUCTION TO SCIENCE

Spring 2014

PRACTICE MIDTERM EXAM

Write your answers on a separate sheet of paper with your name and date at the top of each page.

These questions are similar to what you will see in the midterm exam. The exam will be given on Wed. of week 5 (April 30) second hour. The first hour will be devoted to Q&A for any last minute questions you might have about the material.

The exam will have three kinds of questions to test your memory, your analytical abilities, and your systems thinking abilities. The memory questions help determine if you have learned key terminology and associated concepts, e.g. definitions of terms. The analytical questions will help determine if you can use the principles and concepts to analyze a given problem in terms of systems. Finally the systems thinking questions will help determine how well you are able to use the concepts covered so far in developing a systems-based solution to a given problem.

There are "right" answers to the first kinds of questions. That is, definitions are straightforward. To the second kind of questions the answers may be variable based on what assumptions you use in your analysis. You need to include a statement about those assumptions in your answers. If your analysis is consistent with your assumptions then the answer is good for this test. For the third kind of question there may be many ways to answer that would be acceptable, but, like the second kind a lot depends on what assumptions you make. In this case, those assumptions need to be in the right direction for the answer to be "correct". There are many more ways in which an answer could be unacceptable so spend more time on these kinds of questions. Think through carefully what the problem is; list your assumptions; and then state your "design" for a solution.

1. Write a short definition for the following terms:

    a) Stocks
    b) Flows
    c) Dynamics
    d) Systems thinking

2. Using the figure (20) on page 41 of Meadows' book, explain why the two curves take their shapes in terms of stocks and flows. Be sure to explain the properties and dynamics of energy flow.

3. Consider a system that has been designed to provide a food supply to a community of up to 100 people (like a community garden but with some animal protein, like eggs). What sorts of inputs do you think would be essential to the system? Can you list at least four inputs and explain why you think they are essential? In your explanation consider the sustainability of the production and resilience of the system.