Exam 1 Info

Date: October 18th, 2016

Location: Normal classroom (ARC-107, Busch Campus)

Time: In-class (1:40-3:00 pm)

Notes:

1. There will be **no** MATLAB questions on this exam.
2. You are allowed to bring **one** sheet of **handwritten** notes as a reference during the exam. I will not allow any typed sheets to be used, including the lecture notes (i.e. the main text).
3. Calculators are **prohibited**. All calculations will be able to be completed by hand.
4. **At least one** problem will be taken directly from the homework (HW #1-5).

Suggestions:

1. Read over covered sections in ES notes.
2. Understand all assigned homework questions (solutions on Sakai, except for HW #5, which is due on Thursday).
3. Solve other (unassigned) homework questions (Section 2.10 in the notes, only those relevant to the material covered on this exam).

Material:
All material up to and including what was covered on Thursday's (October 13th) class is fair-game for the exam. Some key topics to review are given below. But be aware: this list is **not** exhaustive, and anything covered could appear on the exam. See the Course Calendar on the website for a complete schedule of the material covered.

<u>Difference equations</u>

(a) Steady states

(b) Linear stability

(c) Cobwebbing

(d) Periodic orbits

(e) Bifurcation diagrams, period doubling, and chaos

(f) Systems of difference equations (particularly steady states and stability)

<u>ODEs</u>

(a) Complete analysis of 1-dimensional equations (steady states, stability, convexity, graphing, etc.)

(b) Steady states of systems of equations

(c) Linear stability (i.e. Jacobian analysis)

(d) Local phase portrait plotting (using the Jacobian)

(e) Chemostat model (formulation and complete analysis)

(f) Nullcline analysis of planar systems (for drawing the vector field, qualitatively)

(g) Michaelis-Menten kinetics (know what it means and how to analyze it)

Also, for both frameworks (difference equations and ODEs), **model formulation and interpretation is important**. You should be comfortable with the arguments made to derive many of the equations (e.g. logistic growth, chemostat) using conservation of mass, and be able to discuss what different terms in a model represent. Furthermore, you should have a good understanding of the assumptions used in each model formulation.