Syllabus for BIOL 391.2
Systems Biology

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Office Hours: M, W 1:00-2:00 PM and by appointment

Classrooms: 206 Collier Hall of Science; TR 11:45 AM-12:55 PM
Class begins the week of March 14 and concludes the week of April 25.

Course Description: Systems biology involves the mathematical modeling of complex and dynamic biological systems. As a field of study it focuses on the interactions between the components of biological systems, and how these interactions give rise to the function and behavior of that system, whether it be at the cellular, organismal, population or ecosystem level of organization. Students will use Stella® software to model dynamic systems involving population growth, predator-prey relationships, enzyme kinetics, epidemics and environmental pollution.

Course Objectives: Upon completion of this course students will be able to:

1) apply the principles of design to problems in the life and environmental sciences
2) understand the basic procedures used to model biological systems
3) apply these techniques to generate models of biological systems
4) understand the concepts of stochastic variation inherent in systems models
5) produce and interpret graphical summaries of information
6) recognize pitfalls in interpreting information

Texts: No specific textbooks are required for this course. All instructional materials will be distributed by the instructor or available on Blackboard.

You will need to purchase a 2" binder and dividers to organize the lesson plans and your notebook reflections.

Class Attendance: It has been my experience that students who do poorly in my courses generally have numerous absences. I strongly suggest that you attend and participate in all sessions unless you have a valid reason not to. Because this class requires your participation attendance in class is required. You get two (2) free absences without penalty. Absences beyond this number, whether excused or unexcused will result in the lowering of your final grade by 5% for each absence. You are still required to complete any assignment associated with a class in order to receive the points associated with that assignment.

Grading: The grading system is as follows:

A	93.0 - 100.0	C	73.0 - 76.9
A-	90.0 - 92.9	C-	70.0 - 72.9
B+	87.0 - 89.9	D+	67.0 - 69.9
B	83.0 - 86.9	D	63.0 - 66.9
B-	80.0 - 82.9	D-	60.0 - 62.9
C+	77.0 - 79.9	F	59.9 and below

Assignments:

Quizzes	20%
Modeling Exercises	30%
Notebook Reflections	20%
Final Project	20%
Project Presentation	10%
	100%

Notebooks: *Good writing and good modeling go hand in hand*. Writing, with all its leaps and minutiae, not only offers a ripe metaphor for building computer models, it also offers a means to compose the models themselves, a way to test them, to hone the model's language, to edit its ideas and logic, to tell its compelling story. Indeed, composing a model without composing words may set the modeler adrift. It is for this reason that these notes are set down.

You will use your notebook to draw reference behaviors in time graphs, identify stocks and flows, draw an annotate models, cut and paste news stories, draw graphical function converters and write the story of the line, draw multipliers and defend or refute the line that defines it, amend models, elaborate on one or more sectors of a model, write equations, compose a story, record or past graphical and tabular outputs and expalin their results, compose questions, tell feedback tales, trace the influence of a multiplier on a single feedback loop, and tell how loop dominance shifts

as a system moves through time. In short you ought to commit some measure of systemic thought to paper EACH day!

1) Always date and label each entry.
2) Be neat.
    - Someone else will need to read this, not the least of whom is ME!
3) Each model entry must include a clear diagram and labeling.
    - The continuous hand drawing and writing of all models or causal loops or notes helps to internalize these ideas.
    - Drawing stocks and flows reinforces their ubiquity in the world.
4) Each model entry should include a reference behavior graph.
    - The model has some meaning on its own, but the structure and conceptual algebra come to life with a graph. Every entry that pairs a graph with a story stiches together these disparate fabrics.
5) Each graph should include a one- or two-sentence summary statement.
    - EVERY graph needs a narrative corollary.
6) Each model entry should include a one- or two-sentence summary statement.
    - These are the "lessons-learned bullets." It's the "so-what?" of the model.
7) Leave space for later notations and instructor commentary.

Policy on Academic Honesty: Moravian College expects its students to perform their academic work honestly and fairly. A Moravian student, moreover, should neither hinder nor unfairly assist the efforts of other students to complete their work successfully. This policy of academic integrity is the foundation on which learning at Moravian is built. The College's expectations and the consequences of failure to meet these expectations are outlined below. If at any point in your academic work at Moravian you are uncertain about your responsibility as a scholar or about the propriety of a particular action, consult your instructor.

Disability Accommodations: Students who wish to request accommodations in this class for a disability should contact the Academic Support Center, located in the lower level of Monocacy Hall, or by calling 610-861-1401. Accommodations cannot be provided until authorization is received from the Academic Support Center.

Class Schedule*
Spring 2016

Day & Date			Topic
T	Mar.	15	A Study of Population Growth I
R	Mar.	17	A Study of Population Growth II
T	Mar.	22	Overview of STELLA Components and Operations Generic Processes I and II
R	Mar.	24	Overview of STELLA Components and Operations Generic Processes III and IV
T	Mar.	29	Drug Assimilation Exercises
R	Mar.	31	Easter Island Population
T	Apr.	05	News Articles
R	Apr.	07	Epidemics and Transferability of Structure
T	Apr	12	Urban Dynamics
R	Apr.	14	Supply and Demand
T	Apr.	19	Pollution Model
R	Apr.	21	Individual Modeling Projects
T	Apr.	26	Individual Modeling Projects
R	Apr.	28	Individual Modeling Projects

*These topics and dates are tentative and subject to change.