Maritime College
State University of New York

Department of Global Business and Transportation

INSTITUTIONAL SYLLABUS – TMGT 8510-01 SYSTM DESIGN AND CONTROL

SPRING 2012

I. COURSE DESCRIPTION

This course examines the consequences of global markets , meaning that successful competition in an uneven cultural, economic, political, and social playing field requires deriving cost efficiencies from constantly re-engineered, extended supply chains. The best of the re-engineering takes a total cost analysis approach, viewing all parts of the supply chain as an integrated whole and leaving nothing in isolation. Students are introduced to the design and control techniques that derive from a systems approach ("Graduate Catalog," 2008, p. 21).

3.000 Credit hours

3.000 Lecture hours

Prerequisite(s): TMGT 7XXX Core Courses

Corequisite(s): None

Follow-On Courses: None

Role in Curriculum: Elective and certificate course

II. TEXT(S)

A. Required Text(s):

1. Drogan, James. *System Design and Control: TMGT 8510*. McGraw-Hill Primus, 2008, 0-39-041036-5. This is a custom printed version of Parts I , II and VII of Sterman, John. *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston: Irwin/McGraw-Hill, 2000, 0-072-31135-5.

B. Additional Material:

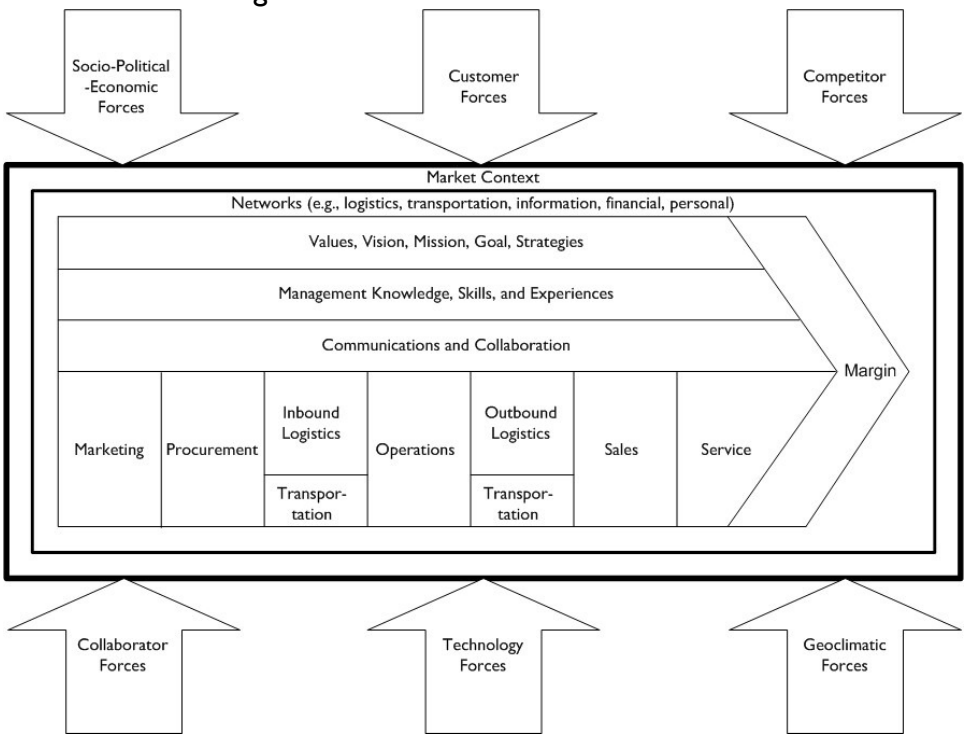
Distributed through ANGEL

III. STUDENT LEARNING OBJECTIVES

A. Course Objectives

1. The student is expected to understand:
   a. The nature of systems; origins, purposes and characteristics.
   b. The criteria the influence the design of systems; contexts and dynamics.
   c. The control of systems; sense, interpret, decide, act, and learn.

2. The student will receive a broad view of systems analysis that will enhance their ability to understand and work towards improving the performance of systems. The supply chain constitutes the system of focus.
    a. Business dynamics, analysis, and design tools are introduced.
    b. The course examines system design and control from various points of view in the following context.



3. The student will come out of this course with improved knowledge and skills in the subject matter, critical thinking and communications. This is intended to enhance their ability to make a meaningful contribution to improving system performance.

IV. COURSE ASSESSMENTS

A. Assessments in the Class

Participation in online and in-class discussion

Teamwork

Project

B. External Assessments

None

V. ACCOMMODATIONS FOR STUDENTS WITH LEARNING DISABILITIES

If you believe that you need accommodations for a disability (also referred to as IEPs and 504 plans), please notify me within the first week of class and contact the Office of Accessibility Services at (718) 409-7348 or email Dean Tardis Johnson at

tjohnson@sunymaritime.edu for an appointment to discuss your needs and the process for requesting accommodations. Since accommodations may require early planning and generally are not provided retroactively, please contact Accessibility Services as soon as possible!

VI. ACADEMIC INTEGRITY POLICY

Absolute integrity is expected of every Maritime student in all academic undertakings.

A Maritime student's submission of work for academic credit indicates that the work is the student's own. All outside assistance should be acknowledged, and the student's academic position truthfully reported at all times. In addition, Maritime students have a right to expect academic integrity from each of their peers.

Students are expected to do their own work in class, on assignments, laboratory experiments, and examinations or tests in accordance with the directions given by the instructor. It is the responsibility of all students to read and understand this statement of College policy on academic integrity. Maritime College considers the violation of academic integrity a serious matter, and one that will be treated as such.

A student who violates academic integrity may, depending on the nature of the offense, be subject to one or more of the following measures: failure of the assignment or examination, failure of the course, dismissal from the Regiment of Cadets, or dismissal from the College. Violations of academic integrity, also known as academic dishonesty, are subject to review by the Judicial Board. For details, go to:

http://www.thezonelive.com/zone/02_SchoolStructure/NY_SUNYMaritimeCollege/handbook.pdf

ALL ACADEMIC INTEGRITY VIOLATIONS WILL BE REPORTED TO THE DEAN OF STUDENTS

TMGT 8510-01 SYSTM DESIGN AND CONTROL

SPRING 2012

INSTRUCTOR INFORMATION

Prof. James Drogan, jdrogan@sunymaritime.edu, 718-409-7289

Office hours: see Faculty and Staff > Faculty/Staff Contact on the Maritime website. Scroll down to Prof. James Drogan and click on the name. Scroll down to see Office Hours.

CLASS MEETINGS

510PM – 740PM, Mondays

Fort A06

CLASS POLICIES

Attendance is mandatory. Please notify the instructor by any available means if you expect to be absent.

Laptops may be used during class if the use is for purposes of the class. This privilege will be rescinded if there is a substantial amount of unauthorized use.

GRADING

Topic	In-Class Discussions	Online Discussions	Teamwork	Project	Totals
Points	75	75	25	75	250
Percentage of Total Points	30%	30%	10%	30%	100%

No makeup work will be assigned and no extra credit is available.

Final Grade Assignments

The initial final grade is assigned according to the following table.

%	GPA	Grade
100.0%	4	A
93.0%	4	A
90.0%	3.7	A-
87.1%	3.3	B+
83.0%	3	B
80.0%	2.7	B-
77.1%	2.3	C+
73.0%	2	C
70.0%	1.7	C-
67.1%	1.3	D+
63.0%	1	D
0.0%	0	F

The initial final grade represents the points attained divided by the total points available. This mathematical guides me in the assignment of the final grade. What this means is that the final grade I assign may be different from the mathematical grade. In assigning the final grade I take into account your consideration, respect, and encouragement of others; your desire for learning and discipline in completing the assignments; your ability to bring relevant issues to the attention of the class.

COURSE OUTLINE

Overview

We are surrounding by systems – banking, transportation, medical, education for example – that we often take for granted simply because they are such a regular part of our lives. We often don't give much thought to what constitutes these systems, why they exhibit certain aspects of behavior, why they fail, what distinguishes a good system from a poor system.

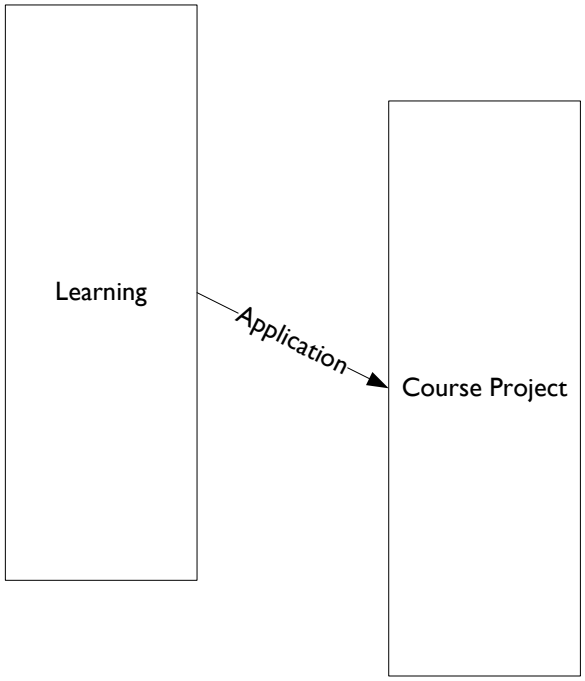
And, in fact, if systems are not our principal responsibility and if they provide the outcome that satisfies us, then we likely don't wish to know any more. This is a natural human reaction, but I find it somewhat unsatisfying not to know how and why systems act the way they do.

My experience with system design and control began in my youth when I worked for my father, a carpenter. This experience received a more formal emphasis when I began working for IBM in 1965 and subsequent to that time I have participated in a considerable amount of system design and control activity – some a success, some not.

I bring this experience into the picture to suggest that this note is not only about some of the theoretical aspects of system design and control, but also about actually trying to get things accomplished. Hence, along the way, I will discuss a few bumps and bruises, how I think they happened and, therefore, what you may be able to do to avoid similar bumps and bruises.

I don't propose that what is here is the only way to think about system design and control. The power that one must develop to be effective in the discipline of system design and control results from an internalization of the thinking of others as well as your own. Let me be clear. Your ability to be competent at system design and control results from your belief in your understanding of and ability to apply the principles and practices of the discipline. Reading this note and books, listening to practitioners in the field is not sufficient. You need to make the discipline yours (Drogan, 2008a).

This course comprises two parallel streams of activity. The first is the learning that is done through formal lectures, reading, and discussions. The second is the course project.



As one might expect the learning starts first and the course project ends last.

Course Design

The course comprises 15 modules covered in 15 course meetings. The fifteenth meeting will be during normal class time in finals week.

The Modules

A description of the objective for each of the modules is given along with the assigned reading. The principal text is Sterman (the customer printer version referred to above). Lecture notes and links to other material will be on ANGEL.

1. Introduction to the Course and to System Design and Control
    a. Description

        In an increasingly complex, rapidly-changing, and opaque world, the design of systems in order to sense, interpret, decide, act, and learning about the world in order to more-or-less respond to developments in an intelligent fashion becomes increasingly critical. This course takes up the issues implicit in this first sentence, aiming to provide the student with knowledge and skills apropos to successfully taking up this challenge.

        This module also introduces the project for the course, *China Set to Tax US-Made Car Imports* (Reed & Beattie, 2011).

    b. Reading

        Introduction to the Course and to System Design and Control (Drogan, 2008a)

        System Dynamics 101(Sgouridis, 2006)

        Why Webvan Drove Off a Cliff (Glasner, 2001)

        Enron: The Drama Goes to trial ("Enron: The Drama Goes to Trial," 2006)

    c. Discussion

        You come into this course with some level of knowledge about system design and control encompasses. Please discuss this level. Also read and respond to what your classmates have to say. Thinking about the associated what, why, how, when, where, and why may be a helpful approach.

2. Learning In and About Complex Systems
    a. Description

        Systems are complex not only in their design and structure,

but also with respect to the dynamic forces encountered and to which the system must respond. It is not enough to think of systems as static. In particular, there is a need for systems to be adaptive in order to contend with the aforementioned dynamics.

b. Reading

Business Dynamics: Systems Thinking and Modeling for a Complex World (Sterman, 2000, chap. 1)

An Introduction to System Design and Control (Drogan, 2008a)

Psychology of Intelligence Analysis. Central Intelligence Agency (Hueuer, 1999, p. iii, v–vii. ix–xi, xiii–xv)

System Dynamics and the Lessons of 35 Years. Massachusetts Institute of Technology (Forrester, 1991)

c. Discussion

What advice are Sterman, Heuer, and Forrester giving regarding analysis and systems dynamics?

How does this advice apply to the course project?

3. System Dynamics in Action

a. Description

Here we examine some real cases and explore how system dynamics was applied to facilitate the desired outcome.

b. Reading

Business Dynamics: Systems Thinking and Modeling for a Complex World (Sterman, 2000, chap. 2)

c. Discussion

Systems most amenable to systems thinking possess certain characteristics. The existing system associated with the importation of automobiles from the US to China also has a set of characteristics.

How do these two sets of characteristics align?

What are the implications of this alignment on our ability to

define the type of solution called for in Introduction to the Course Project?

What conclusions can we draw about our potential for success?

What actions are suggested that might improve our chances for success?

4. The Modeling Process
    a. Description

        A critical step in applying the principles of system dynamics to the resolution of issue is the development of a model that is calibrated to reality. We take up this matter in this module.

    b. Reading

        Business Dynamics: Systems Thinking and Modeling for a Complex World. Chapter 3 (Sterman, 2000, chap. 3)

        Cultural Acumen for the Global Manager: Lessons from Project GLOBE. Organizational Dynamics, 29(4), 289-305 (Javidan & House, 2001)

    c. Discussion

        China and the US are arguably the two hegemons of the modern world. The countries are founded on two substantially different cultural and economic models. In what ways do these differences affect our solution?

5. Structure and Behavior of Dynamic Systems
    a. Description

        While Sterman asserts "The behavior of a system arises from its structure" (p. 109), it may will be true that the structure is shaped by its behavior. This module takes up these two items.

    b. Reading

        Business Dynamics: Structure and Behavior of Dynamic Systems (Sterman, 2000, chap. 4)

        An Introduction to the Supply Chain (Drogan, 2008b)

    c. Discussion

        Principal Dynamics in the Project Supply Chain

6. Causal Loop Diagrams
    a. Description

        While Sterman asserts "The behavior of a system arises from its structure" (p. 109), it may will be true that the structure is shaped by its behavior. This module takes up these two items.

    b. Reading

        Business Dynamics: Structure and Behavior of Dynamic Systems (Sterman, 2000, chap. 5)

    c. Discussion

        The Relationship Between Key Variables in the China Case

7. Stocks and Flows
    a. Description

        In a system, a supply chain for example, stocks, such as inventory, accumulate. Inventory, of course, serves as a buffer between components of the supply chain and carries with it associated costs. Causal loops, of and by themselves, do not account for this. Hence, we need stocks and flows.

    b. Reading

        Business Dynamics: Structure and Behavior of Dynamic Systems (Sterman, 2000, chap. 6)

    c. Discussion

        Critical Stocks and Flows in the China Case

8. Dynamics of Stocks and Flows

    a. Description

        Perhaps the intent of this module is best captured by the opening words in chapter 7 of Sterman attributed to Ian Stewart.

        "The successes of the differential equation paradigm were impressive and extensive. Many problems, including basic and important ones, led to equations that could be solved. **A process of self-selection set in, whereby equations that could not be solved were automatically of less interest than those that could** [emphasis added]".

        To that I would add: "If stated reasons don't sit well with your conscience or stand the test of logic, look for deeper motivations." Docent Glax Othn in Brian Herbert and Kevin J. Anderson, *Dune: The Butlerian Jihad* , 1st Edition ed. (Tor Books, 2002).

        This module takes up, if you will, common sense as a key element of system dynamics.

    b. Reading

        Business Dynamics: Dynamics of Stocks and Flows (Sterman, 2000, pp. 231–241)

        Remaking the World: Adventures in Engineering. New York: Alfred A. Knoff, Inc. (Petroski, 1997, pp. 47–55)

    c. Discussion

        Desk Checking the China Case

9. Closing the Loop: Dynamics of Simple Structures
    a. Description

        Business dynamics (frequently referred to in this course as system dynamics) is not a theoretical, pie-in-the-sky, equation based and computational heavy exercise of little practical value. The examples from Sterman, your work on the real supply chain you discovered in Supply Chain I and II should be sufficient proof that there is practical and potentially valuable application of the concepts that have been covered in this course to this point.

        This module is that last of those that constitute our examination of system dynamics in this course. It's therefore time to take stock of system dynamics and the manner in which relates (or does not as the case may be) to the world around us.

    b. Reading

        Business Dynamics: Closing the Loop: Dynamics of Stocks and Flows. (Sterman, 2000, chap. 8)

        The Plan for the Project (Drogan, 2012)

    c. Discussion

        The Value of System Dynamics within the Context of the China Case

10. Behavior of the Solution
    a. Description

        Our task is to design and implement a system of control that will affect the system to be controlled that is embedded within a larger context. That is, the system that supported the Chiinese in making their decision was itself affected other forces in the larger context.

        The control system comprises processes, information, and people integrated together (i.e., the business system) in support of business decisions for achieving the goals and objective of the business. This business system is enabled, but never entirely subsumed, by the technology system. The technology system is itself comprise of various components (e.g., processors, devices, storage, software, and the like) that is in constant andf rapid change. It seems somewhat low

value, if not useless, to therefore describe the control system in terms of how it is built. Rather, we should describe it in terms of how ithe control system behaves. Subsequently, the technology will be selected to deliver the required behavior.

This module takes up the question of the specification of behavior.

b. Reading

A Note on Business Drivers, Business Configuration, and Information Technology Strategy (Drogan, 2005a, pp. 4–7). Begin on p 4 with "The connection between the business configuration…" and end just prior to "Reach, range, and behavior…" on p 7.

Note on Building a Management System (Drogan, 2005b)

c. Discussion

Behavior of the Solution

11. Modules 11-14 are being rewritten and will be made available as soon as possible.

Schedule

b

#	Date	Day	Topic	In-Class Discussions	Online Discussions	Teamwork	Project	Totals
	1/16/2012	Monday	Martin Luther King Holiday - No Classes					
1	1/17/2012	Tuesday	M1: Introduction to the Course and to System Design and Control; Introduction to the Course Project (China Set to Tax US-Made Car Imports)	5	5			
2	1/23/2012	Monday	M2: Learning in and About Complex Systems	5	5			
3	1/30/2012	Monday	M3: Business Dynamics in Action	5	5			
4	2/6/2012	Monday	M4: The Modeling Process	5	5			
5	2/13/2012	Monday	M5: Structure and Behavior of Dynamic Systems	5	5			
	2/10/2012	Monday	President's Day - No Classes					
6	2/22/2012	Wednesday	M6: Causal Loop Diagrams	5	5			
7	2/27/2012	Monday	M7: Stocks and Flows	5	5			
8	3/5/2012	Monday	M8: Dynamics of Stocks and Flows	5	5			
9	3/12/2012	Monday	M9: Closing the Loop: Dynamics of Simple Structures	5	5			
10	3/19/2012	Monday	M10: Solution Behavior (External View)	5	5			
11	3/26/2012	Monday	M11: Solution Structure (Internal View)	5	5			
12	4/2/2012	Monday	M12: Completing the Connection to the Context	5	5			
13	4/5/2012	Thursday	M13: Implementation	5	5			
	4/9/2012	Monday	Sprng Break - No Classes					
14	4/16/2012	Monday	M14: A Few Loose Ends	5	5			
15	4/23/2012	Monday	M15: Project and Course Review	5	5	25	75	
			Points	75	75	25	75	250
			Percentage of Total Points	30%	30%	10%	30%	100%

References

Drogan, J. (2005a). A Note on Business Drivers, Business Configuration, and Information Technology Strategy. Retrieved a from http://jmsdrgn.squarespace.com/storage/A%20Note%20on%20Business%20Driver

s%20Business%20Configuration%20and%20Information%20Technology%20Strategy.pdf

Drogan, J. (2005b). Note on Building a Management System. Retrieved b from http://jmsdrgn.squarespace.com/storage/Note%20on%20Building%20a%20Management%20System.pdf

Drogan, J. (2008a). An Introduction to System Design and Control. Retrieved from http://jmsdrgn.squarespace.com/storage/An%20Introduction%20to%20System%20Design%20and%20Control.pdf

Drogan, J. (2008b). An Introduction to the Supply Chain. Retrieved b from http://jmsdrgn.squarespace.com/storage/An%20Introduction%20to%20the%20Supply%20Chain.pdf

Drogan, J. (2012, January 8). The Plan for the Project. Unpublished.

Enron: The Drama Goes to Trial. (2006, July 26).*The Economist*. Retrieved January 7, 2011, from http://www.economist.com/node/5453797

Forrester, J. W. (1991). *System Dynamics and the Lessons of 35 Years*. Massachusetts Institute of Technology. Retrieved from http://sysdyn.clexchange.org/sdep/papers/D-4224-4.pdf

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Sgouridis, S. (2006, May 2). *System Dynamics 101*. PowerPoint, Massachusetts Institute of Technology. Retrieved from http://ocw.mit.edu/courses/engineering-systems-division/esd-04j-frameworks-and-models-in-engineering-systems-engineering-system-design-spring-2007/lecture-notes/lec23.pdf

Sterman, J. (2000). *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston: Irwin/McGraw-Hill.