Syllabus for ENSTU 375 – Sustainability Systems – CRN:

4 units

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When is class?	Wednesdays and Fridays, 12-1:50 PM
Where is class?	Chapman Science Building Room S 128
If you need to talk to me outside of class…	My office hours are T Th 10-11 and Wed. 2-3. You can also join me for lunch, if you like, any Tuesday from 12-1. I am also available by appointment, please email me for that.

If accommodations are needed

Students with disabilities who require accommodations such as time extensions or alternate media/format must present verification from Student Disability Resources prior to Sept. 10. Please schedule an appointment to discuss specifics with me. If you think a disability may impact your performance in this class, meet with SDR professional staff in the Health and Counseling Centers Building (#80) or call 582-3672 and see me by appointment.

Also, contact:

Student_Disability_Resources@csumb.edu

Building 80
Phone: 831/582-3672 voice, or 582-4024 fax/TTY

http://sdr.csumb.edu/

Q: What is a system?

A: A system is defined to be a set of "elements" that are interconnected and organized for some purpose. This is an enormous window that encompasses topics that include, but are not limited to, molecular systems, cells, organisms, communities, ecosystems, social systems, economic systems, healthcare systems, educational systems, political systems, corporate systems, systems of government, atmospheric systems, ocean systems, and earth systems, just to name a few. Just look at all of the places in our language that the word "systems" appears and you will be reminded of the ubiquity of systems concepts. This class will look at general concepts of systems and it will address how they can be applied toward issues of sustainability.

One of the things I like about this class is that systems thinking is a lot about telling stories, since proper stories often convey important elements and items associated with this topic.

Books to be used or referenced in this class:

Required: Donella Meadows Thinking in Systems. ISBN-13: 978-1603580557

Recommended (I will refer to them/excerpt from them and you may find them useful):

Richmond, Barry, An Introduction to Systems Thinking with STELLA, 2004, ISBN 13: 9780970492111

Fritjof Capra and Pierre Luigi Luisi, The Systems View of Life: A Unifying Vision, 2014, ISBN: 9781107011366

Hiroki Sayama, *Introduction to the Modelling and Analysis of Complex Systems, SUNY Open Textbooks, August 13, 2015, ISBN 978-1-942341-09-3.* http://textbooks.opensuny.org/introduction-to-the-modeling-and-analysis-of-complex-systems/

Peter Senge, The Fifth Discipline: The Art & Practice of The Learning Organization, ISBN: ISBN-13: 978-0385517256

Peter Senge, The Fifth Discipline Fieldbook: Strategies and Tools for Building a Learning Organization, ISBN-13: 978-0385472562

Peter Senge et al, The Necessary Revolution: How Individuals and Organizations Are Working Together to Create a Sustainable World ISBN-13: 978-0385519045

John D. Sterman, Business Dynamics: Systems Thinking and Modeling for a Complex World, 2000, ISBN: 00723111355

David Peter Stroh, Systems Thinking for Social Change, 2015, ISBN: 1-978-1-60558-580-4.

Outcomes

1) Define and describe a system.
2) Give examples of systems in your everyday life.
3) State and describe principles of system function.
4) Sketch causal loop diagrams for a variety of systems.
5) Sketch stock and flow diagrams for at least three of the archetypal system traps.
6) Describe system leverage points and how they can potentially provide a way out from the system traps.
7) Describe the properties of resilience, self-organization and hierarchy and apply these concepts to address issues of system sustainability.
8) State and describe places to intervene within a system and compare their relative effectiveness.
9) Exhibit critical thinking through a systems analysis of an issue of your choosing.

10) Apply thorough systems thinking and effective communication toward the understanding and explanation of an issue of your choosing.

Outcomes that I hope you achieve, but cannot easily assess

1) Apply systems thinking in your everyday life.
2) Change your thinking process (become a systems thinker).
3) See the system behind every issue you read or hear about.
4) Be able to use systems thinking when discussing or describing issues of importance to you.

Grades based upon

HW activities and assignments: 65%
Main project: 20%
Class participation 10% (based on written responses during class)
Transportation Journal: 5%

Class written responses involve a quarter sheet of paper on which you will write your name and the date and the class (ENSTU 375). Then you will write something you heard in class and, if you have any questions, please include those. For each one that you submit, I will mark that you participated in class that day.

Late work: If you have an emergency, please let me know. Otherwise, any work submitted after any due dates will receive a 40% reduction.

Grading Scale

97-100%	A+
93-96	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
77-79	C+

72-76	C
70-71	C- (lowest passing grade)
67-69	D+
63-66	D
60-62	D-
< 60	F

Prerequisites

GE writing A1-A4
GE Science and Math (B1-B4)

Academic Integrity

Academic Integrity is of central importance at CSUMB. The core of this integrity resides in the scholastic honesty of the CSUMB community, and therefore, is the responsibility of all students and faculty to uphold and maintain. Forms of academic dishonesty include: cheating, fabrication, plagiarism, and collusion in any of these activities. We value informal resolution of academic integrity allegations; however, students discovered to have engaged in academic dishonesty will be sanctioned.

For more information regarding the Academic Integrity Policy, please go to: http://policy.csumb.edu/site/x20830.xml.

Some work will involve collaboration with your peers, but, on individual assignments, I expect to see your own written work, cited appropriately. If evidence of copying or plagiarism is determined, for the first offense no points will be given for that assignment and, by university policy, the incident needs to be reported. Subsequent incidents will result in further measures and could result in failure of the course.

Student Email Notification

CSUMB policy establishes email as the primary and official means of communication from California State University, Monterey Bay to students. This includes faculty communication to students and will be used for communication in this course. Students are therefore expected to check their email on a frequent basis.

Cooperative Learning Center (formally ASAP)

The Cooperative Learning Center (ASAP), a campus-wide tutoring program, is free and open to all students and offers peer tutoring services and workshops. It seeks to provide high-quality learning assistance in computer technology, math, science, writing, languages and study strategies aimed at enhancing learning needs at all ability levels. The Cooperative Learning Center works with students to expand their knowledge and abilities by empowering them to become independent learners. The Cooperative Learning Center's tutors, staff, and faculty work together to design and offer effective, collaborative, and active learning experiences. We provide tutors with the opportunity to develop teaching, leadership, and communication skills. The Cooperative Learning Center is located in the Library, 2nd floor, 582-4104.

Sexual Misconduct, Dating and Domestic Violence, and Stalking

CSUMB is committed to creating and sustaining an environment free of sexual misconduct, dating and domestic violence, and stalking. If you experience any of these forms of misconduct, CSUMB encourages you to utilize the resources described below.

To report any type of misconduct:

University Police Department
Emergencies: 911
Non-emergencies: 831-655-0268

Title IX: Discrimination, Harassment, and Retaliation Office
Call: 831-582-3510
Email: wensmith@csumb.edu
Email is recommended for fastest response

For confidential support:

Campus Advocate/Monterey County Rape Crisis Center
Call or text: 831-402-9477
24 hour crisis line: 831-375-4357

Personal Growth and Counseling Center (PGCC)
Call: 831-582-3969

Any CSUMB staff or faculty member other than the campus advocate or PGCC counselors who are told about student experiences of misconduct must report information to the Title IX office. Only PGCC and campus advocate staff can keep such information confidential.

Student Veterans and Active Duty Personnel

"Veterans, active duty military personnel with special circumstances (e.g., upcoming deployments, drill requirements, disabilities) are welcome and encouraged to communicate these, in advance if possible, to the instructor."

You will find more helpful information in the VA campus toolkit at http://mentalhealth.va.gov/studentveteran/

Date	Topic	Accompanying reading

Week of August 27	Introduction, history, course overview, I Love Lucy excerpt and discussion, Projective Geometry introduction, Sterman Video.	Meadows, Ch. 1
Week of September 3	Causal Loop Diagrams – what, why and how. -Causation versus correlation - loops and feedback - link and loop polarity Projective geometry – generation of ellipse	Meadows, Ch. 1; Sterman, Ch. 5.
Week of September 10	More on causal loops -delays -naming -tips and tricks Causal loop examples	Sterman, Ch. 5
Week of September 17	Systems diagrams; stocks and flows; feedback; reinforcing loops and balancing loops; One stock systems. Projective geometry – dual of ellipse	Meadows, Ch. 2; Sterman, Ch. 6
Week of September 24	The Beer Game	Senge, Ch. 3; Meadows, Ch. 2
Week of October 1	Resilience, self-organization and hierarchy; Projective geometry – Pascal's Line	Meadows, Ch. 3;
Week of October 8	System surprises – linearity/nonlinearity; boundaries, limits,	Meadows, Ch. 4, Sterman, Ch. 4.2.

	thresholds, delays, and bounded rationality. Projective geometry – Brianchon's Point	
Week of October 15	The S-curve Projective geometry – pole and polar. Two stock systems and Fish Bank activity	Meadows, Appendix; Sterman, Ch. 4.2
Week of October 22	System traps – limits to growth; Growth and underinvestment. Projective geometry – degeneration of hexagon	Meadows, Chapter 5
Week of October 29	System traps – shifting the burden; fixes that fail; Projective geometry – degeneration of hexagon, continued	Meadows, Chapter 5; Senge Appendix 2
Week of November 5	System traps – success to the successful; tragedy of the commons;	Meadows, Chapter 5; Senge Appendix 2
Week of November 12	System traps – rule beating; seeking the wrong goal; System leverage points -	Meadows, Chapter 5; Senge Appendix 2 Meadows, Chapter 6;
Week of November 19	System traps – drift to low performance; escalation;	Meadows, Chapter 5; Senge Appendix 2
Week of November 20	Thanksgiving Holiday	
Week of November 27	Project work; Living in Systems	Meadows, Chapter 7; Capra introduction
Week of December 4	Project work	
Week of December 11	Project presentations	