Infrastructure and Systems Thinking Curriculum – Third Year Running
Daniel Fernandez, CSUMB
Brief History of these classes

2011: Idea for classes along with new Environmental Studies Major
2012: New classes proposed
2013: CHESC presentation on soon-to-be-taught classes
2013-2014: First offering
2014: CHESC presentation on 1st year of classes
2014-2015: Second offering
2015: Here we are, CHESC presentation on 2nd year
Sustainability Systems

A class to address systems thinking in multiple contexts
Outcomes
Define and describe a system, give examples of systems in your everyday life, state and describe principles of system function.
Example of a system

Unicycle
Lucille Ball

Capra presentation

Matthew Nelson – and the body system
Dr. Wayne Porter – Systems Modelling of City of Salinas
Artistic Reflections on Issues of Sustainability and Systems Thinking

Wednesday, Dec. 3, 12:00-1:50 pm, Alumni and Visitor Center — free of charge*

12:00 Introduction — Dan Fernandez
12:05-12:20 Associated Students Environmental Committee and the Real Food Challenge — Rachel Sutton, Gerardo Marcano, and Stephanie Yee

12:20-12:50: An Artist’s Sculptural Commentary on Human Survival, the Environment and Mythology

Using fragments of blown tires, artist Peter Hiers explores the interconnected web that provides for human survival, and its contradictory appeals and perils. The body of work is about our increasing dependence on vulnerable networks of transportation, electricity and finance for our food, clothing, shelter, health and safety needs. Additionally, the culture of material acquisition and excess consumption creates further environmental consequences. Ripped tire fragments metaphorically illustrate the violent tension between such human activities and forces in the natural world. We need a new ideology that provides a sustainable, balanced means for human survival within the natural world that supports us.

12:50-1:20: Dance, Ecology, Somatics, and Permaculture

Matthew Nelson engages an eco-somatic perspective in dance artistry and movement education. Ecology is a science of experimentation, examining how living systems interact. We are living systems, participating in living systems and composed of living systems. Somatics, the study of the body from an experiential first-person perspective, is a subjective and non-scientific reflection. Yet, somatic research is similarly experimental and observational in regard to human movement. An eco-somatic viewpoint makes subjective meaning of the experience of moving and perceiving the body while attending to the objective anatomy and kinesiology of the body as a living system. An ecological view of embodiment—the experience of having a body—seeks connectivity intra-personally and inter-personally through movement and awareness.

1:20-1:45: Panel discussion with the artists

*Note that there is a $2.00 parking fee for those who drive. Directions to the Alumni and Visitor Center may be found online.
A photo from Dr. Porter’s 2014 Monterey TedX talk
Sketch causal loop diagrams for several archetypal systems

Causal Loop Diagram for Escalation Archetype

From Bellinger, http://www.systems-thinking.org/arch/arch.htm#archgu
Describe system traps and leverage points

Traps – The result of many of the archetypes, such as

- Ecalation
- Fixed that Fail
- Tragedy of the Commons
- Erosion of Goals
- Race to the Bottom
- Success to the Successful

From Bellinger, http://www.systems-thinking.org/arch/arch.htm#archgu
Describe properties of resilience, self-organization and hierarchy and apply these concepts to address issues of system sustainability. (not to omit antifragility)
Simulate a system based on implementation of the framework established in a systems diagram.

Stella simulation of extraction from a finite resource.
State and describe places to intervene within a system and explain their relative effectiveness.

Changing numbers
Changing stocks and flows
Changing delays within the system
Creating balancing or reinforcing feedback loops
Changing information flows
Allow for self organization
Change goals
Change paradigms
Transcend paradigms
Projective Geometry as a Paradigm for Systems Thinking

Student submission

Former student inspiration
Other items of interest

Beer Game

Fishbanks
Infrastructure Systems Class

Why offer it?
12 infrastructural areas addressed through weekly readings and panels
Some comments on the class

This class needs to be offered every semester so that students can have the ability to take the more advanced systems class if they are interested in learning even more.

Panel discussions were definitely my favorite part of this class. It's nice to see the community so involved in education and talking to young people about the real issues in today's society.

I enjoyed the panels and presentations.

I love class discussions. Some of the panels were great while other panelists brought down the impact of the topic.

I did think the reading and the panel were sufficient, the class discussion was sometimes redundant.

Friday panels were an incredibly effective way to connect the material discussed in the book and class to the real world. Being able to see what careers work with the infrastructure discussed made me interested in learning more.
I think there's a lot more I can learn about public infrastructure but this class was a great start to making me really think about how things work in this world.

I learned more about the infrastructure of: roadways, water ways, transportation, communication, policy regarding building construction, mechanisms for funding these vital services, than I ever have in the rest of my life combined.

I've learned more from this class than almost any other class. The course topic is extremely useful and I wish everyone could take this class for a basic understanding of infrastructure. I'm also excited to have taken this class to help in the future with my career.
Next Steps

Living Lab Award – Sustainable City/Sustainable Communities Year Program Presentation tomorrow at 2 pm.

Living Lab Award:  Goal: reduce cars driving on campus.
To look at measuring and modelling impacts of changes to campus transportation system.
To measure and incentivize campus bicycle use.
To measure and identify challenges to using bus system.

To work with the City of Salinas to improve connectivity between CSUMB students and city activities.
The key is not to prioritize what's on your schedule, but to schedule your priorities.

Steven Covey