

Northwestern University  
Executive Management for Design and Construction

## **Systems Thinking For Sustainable Design**

### **PROJ\_MGT 446**

#### **Course Objective:**

Creating a sustainable future is not possible without systems thinking. Sustainable design is too complex, with many interacting systems, to be tackled in a linear fashion. However, as with many disciplines, we try to force sustainable design into a way of thinking that is generally compartmentalized. If we want to sustain planetary and human systems for future generations, we need to develop our capabilities to think beyond simplistic or linear solutions. Our goal in this class is to explore holistic thought processes, and challenge our standard ways of thinking.

For students who are keenly interested in new ways of thinking about sustainable solutions to the issues of our time, we will explore ideas, methodologies and frameworks that transcend commonly used tools such as LEED, which can turn sustainable design into a series of checkboxes. Rather, we need to understand how projects fit into, affect and are affected by the larger context of their environment. Each project requires new and holistic thinking to ensure its success in the broader context of its ecosystem. Living systems, regenerative design principles and case studies will comprise many of the core discussions.

During the quarter, students will explore systems thinking together. The course will include individual and group exercises. Lectures will be based on the text as well as various articles and case studies that students will be expected to read ahead of each class and be prepared to discuss. We will have guest speakers who are working in the context of large systems and who will discuss the opportunities of using a systems process and the pitfalls of not thinking in terms of systems. Students are expected to attend and participate in every class. This class will include videos prepared by the instructors, readings, other videos, and a weekly online webinar.

In this course, we will engage with systems thinking resources and tools that allow students to move projects into a developmental, transformative, sustainable direction. We all are co-learners and our intention is that we develop a way of being in the world that comes from a systems perspective inviting the opportunity to be a change agent for ecosystem sustainability.

#### **Week-by-week description of the course:**

**Week 1**      **Introduction to Systems Thinking Paradigms, and Regenerative Design and Development**  
The purpose of this session is to provide a general introduction to systems thinking and to provide a solid foundation for the course. Students will participate in interactive exercises. We will discuss expectations, format, and workload for the course.

- Week 2**      **Paradigms and Seeing Systems Everywhere**  
The purpose of this session is to introduce living and mechanistic system paradigms as well as several social paradigms in a way that students begin to experience how living systems work. Students will be asked to observe “living systems in the real world” and to present their observations. (This will be an ongoing practice throughout the course.)
- Week 3**      **Patterns and Mental Models**  
The purpose of this session is to introduce ways of seeing systems through patterns, nested systems, frameworks and mental models using a regenerative development and design paradigm. Students will be introduced to the importance of place as a way to identify and work with systems. They will also be introduced to developmental ways of thinking and “story of place” research for individual projects.
- Week 4**      **Discovering Vocation/Purpose & Genuine Wealth**  
In this session, we will introduce the idea of vocation as a way to understand purpose – natural or man-made purpose, or purpose of a project. The concept of genuinewealth, which includes financial, natural, human, social and produced capitals will be introduced as a way to create and understand living systems that include all stakeholders and that have the potential to continuously co-evolve. Climate Interactive, a way of seeing systems developed by MIT, will be introduced.
- Week 5**      **Identifying Potential – Healthy Ecosystems and Value-Adding Roles**  
The purpose of this session is for students to understand and experience their role in projects beyond the common perceptions of sustainable design and development in a way that promotes co-evolution of healthy ecosystems and human communities. Students will be introduced to the concept of value-adding roles and identification of “potential” as a means to understand and work with systems. We will review the story of place research conducted over the previous two weeks.
- Week 6**      **Transformational Leverage**  
This session is designed to apply the lessons of the previous weeks to complex sustainability challenges so that students can recognize and develop approaches to addressing those challenges. The session will focus on finding the most effective leverage points in a system by finding where exchanges of materials, information, and energy occur.
- Week 7**      **Traps and Opportunities**  
In this session, we will introduce system traps using real world examples and will explore how regenerative systems thinking can be used to find potential and opportunities.
- Weeks 8-9**      **Being Developmental and Practice with Systems Thinking in the Real World**  
The purpose of these sessions is to apply the tools introduced in earlier sessions in a way that instills confidence so that students have a firm understanding of systems thinking and regenerative design and development principles and methodologies.  
Students will be encouraged to delve deeply into their own ways of being such that they can become agents of change.

## **Week 10**      **Final Project Paper and Presentations**

In lieu of a final exam, students will write a paper and give a presentation based on systems thinking principles and frameworks.

### **Canvas Dialogue:**

In this course students should not expect to be given answers. Students will participate in a graded discussion based on their own thought processes as they work through the concepts covered in the class and in the homework. Specific assignments will be provided and students are expected to reflect and write about those assignments during the week. Daily participation is anticipated.

Professors will post one or more questions during the week. Students are encouraged to post their own questions/answers and respond directly to one another. Students will post responses no later than 9 a.m. Sunday, and discussion with each other on the forum must be completed by 9 a.m. the day of class.

### **Class Participation & Attendance:**

Our thinking related to systems and sustainability will evolve as new concepts are reviewed and distinguished. Therefore, a key component of the class includes the class discussions. Students are expected to attend all classes, be on time and contribute to the discussions. Class discussions will include, among other topics, discussion of systems concepts, frameworks, readings, and case studies. Students will observe “living systems in the real world” and be asked to discuss their observations in class. Students will participate in “fishbowl” resourcing where professors will interview them about their assignment, so all participants gain a greater understanding of the course material.

### **Graded Assignments:**

Graded assignments include interim deadlines for the Individual Paper, evaluations of “Living Systems in the Real World” assignments, an Outdoor Observation, and interim assignments for individual projects applying regenerative development and design research. Assignments are expected to be submitted by the deadline or grade will be reduced.

### **Individual Paper:**

Each student will write a five to ten-page paper, double-spaced, that discusses:

Based on something that you are committed to, image a new vision for your neighborhood, city, industry, country or the world using living systems principles. What do you see as your role in your vision? What would you like to pursue? Please describe your vision as an image (scene) in your paper.

Thinking through the lens of the regenerative paradigm and the living systems frameworks that we discuss in class (nested systems, law of three, etc.), think of a project that you would like to work on that would serve your new vision. This may be something that you have thought about or worked on for a while or something new. Describe your commitment and the effort necessary (will, being, and function) for you to achieve your vision. How would you approach projects (and this one in

particular) differently now that you've taken this class? What systems thinking distinctions will you bring and why? How is this effort co-evolutionary and developmental? Who else would need to participate in developing your vision for it to be realized?

At a minimum address the following frameworks in your paper:

- Nested Systems (three lines of work, your project)
- Law of Three (potential)
- Will, Being, and Function
- Genuine Wealth (5 capitals)

We are looking for thinking that goes beyond what you already know. This is a big request; however, by using the systems thinking principles and frameworks that we have discussed in class, we anticipate you being able to see things that would not have been visible to you before taking this course.

This paper will be based on each student's original thoughts. You may include information from other people's thoughts/work; however, that work must be cited, and excerpts from others longer than one paragraph will not be accepted. Plagiarism will result in a failing grade. Paper Grades will be based on depth of thought and demonstration of understanding of systems thinking frameworks.

**Final Presentation:**

In lieu of final exam, students will present the highlights of their paper in a five to seven-minute prepared presentation. The presentation should have a beginning, middle, and end. Professors and fellow students will be given an opportunity to ask questions.

**Grade Determination:**

*Grading will be based on organization, understanding of the frameworks, clarity, depth of thought, and presentation delivery.*

Canvas, Participation, Attendance	30%
Graded Assignments	30%
Individual Paper	20%
Presentation (in lieu of final exam)	20%

**Text:**

"Regenerative Development and Design: A Framework for Evolving Sustainability," Mang, Haggard, Regenesis, 2016. Additional materials will be provided by the instructors.

**NOTE:** *This course description explains the essence of the material covered. Canvas is the best source for the most up-to-date information about specific details for any given offering of the course.*