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SYSTEMS THINKING FOR SUSTAINABLE DESIGN, PROJ_MGT 446

Master of Project Management Program, Northwestern University

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Course Objective

Creating a sustainable future is not possible without systems thinking. Sustainable design is too complex to be tackled in a linear and compartmentalized fashion. If we want to sustain planetary and human systems for future generations, we need to develop our capabilities to think in terms of living systems. Our goal in this class is to explore holistic thought processes and challenge our standard ways of thinking.

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.

In the class, we will engage with systems thinking resources and tools that allow students to move projects into a developmental, transformative, regenerative direction. We are all 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.

The course will include individual and group exercises. Lectures will be based on the text as well as articles, videos, and case studies that students will be expected to read and review ahead of each class and be prepared to discuss. We will have guest speakers who are working on large systems and who will discuss the opportunities of using a living systems process and the pitfalls of not thinking in terms of systems.

WEEK 1 **Introduction: What is a System? Wholes and Nestedness**

The purpose of this session is to provide a general introduction to systems thinking and to provide a solid foundation for the course. We will contrast mechanistic and living systems. Students will participate in interactive exercises. We will discuss expectations, format, and workload for the course.

WEEK 2 **Paradigms and Mental Models**

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. We will introduce the 7 First Principles of Regeneration, an organizing framework for this course. 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 Nodes**

The purpose of this session is to introduce ways of seeing systems through social, political, ecological, and physical patterns, nested systems, and nodes of energy where these patterns intersect. Our guest speaker is a certified biomimicry professional who applies nature's genius to the built environment.

WEEK 4 **Essence, Potential, Vocation/Purpose**

In this session, we will introduce the "story of place" as a way to discover the unique essence of a place and how that essence can be informed by patterns and nodes. We will explore how honoring essence leads to unrealized potential and vocation, or shared purpose – natural or man-made purpose, or purpose of a project.

WEEK 5 **Genuine Wealth and Value-Adding Roles**

We will introduce the concept of genuine wealth, which includes financial, natural, human, social and produced capitals to illustrate how living systems that include all stakeholders have the potential to continuously co-evolve. Students will be introduced to the concept of value-adding roles as a means to understand and work with systems.

WEEK 6 **Fields, Imaging Systems Working**

In this session, we will review real world examples and will explore how regenerative systems thinking can be used to find potential and opportunities.

WEEK 7 **Nodal Intervention and 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. In contrast to intervening with parts of a system to effect change, the session will focus on finding the most effective leverage, or acupuncture points, in a system by finding where exchanges of materials, information, and energy occur that will transform the entire system. Our guest speaker will share examples from his own work in regenerative design and development.

WEEK 8 **Our Place in the System, Building Capability**

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 encouraged to delve deeply into their own ways of being such that they can become agents of change. Our guest speaker will share examples from his own work in regenerative design and development.

WEEK 9 **Bringing it All Together**

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. We'll hear from a past student who has applied regenerative systems thinking to a project in her community.

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.

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

Journal: Students will keep a Journal where they reflect each week on how their thinking has evolved since the previous week. Each student will post an overall reflection to our ongoing Canvas Discussion.

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.

Assignments: Assignments include interim deadlines for the Individual Paper, evaluations of "Living Systems in the Real World" assignments, outdoor observations.

Individual Paper: Living systems thinking is based on the 7 first principles of regeneration.

Each student will write a 4-8-page paper, 1.5-spaced based on the living system that you have worked with and analyzed throughout the course. To help set the context for your paper, include a brief description of the system you worked with.

The paper is a reflection based on the continuing evolution of your thoughts throughout the class, including thoughts beyond what you wrote in the interim assignments. It should be able to stand on its own without making reference to previous assignments.

You may find it helpful to use the thinking frameworks we introduced in class, such as the Law of Three and the 7 First Principles of Regeneration, as organizational tools for your discussion.

We are looking for thinking that goes beyond what you already know. 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. Also, consider how you might apply what you've learned to future endeavors.

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 other people's work longer than one paragraph will not be accepted. Plagiarism will result in a failing grade.

Final Presentation: In lieu of a final exam, you will deliver a timed 5-7- minute presentation of reflections on how your thinking has evolved throughout the class, including the process of preparing your final

paper. In your reflections, include insights that will help your fellow students understand living systems better.

Evaluations will be based on structure (beginning, middle and end), clarity of ideas, ability to make them understood orally, the extent to which your ideas are value-adding toward others' understanding, and adherence to the required time range.

Course Grade: The course grade will consist of the following areas:

Class Participation, Attendance	30%
Assignments and Journal	30%
Systems Thinking Individual Paper (in lieu of final exam)	30%
Presentation (in lieu of final exam)	10%