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Text: Jørgensen, Sven E., 2012, Introduction to Systems Ecology, CRC Press, Boca Raton FL

Course Description and Objectives
This one week intensive course will introduce the principles and tools of modern Systems Ecology. While course materials will cover a broad understanding of the field, this course will emphasize thermodynamics and network ecology. Examples will emphasize the application of Systems Ecology for understanding and managing both natural and urban ecosystems. It will also emphasize applications of systems ecology for water resource management. Upon successful completion, students will be able to:

- Identify the primary concepts, tools, and goals of Systems Ecology;
- Describe how their specific research interests intersect with Systems Ecology;
- Sketch the history of Systems Ecology including the major contributors and their contributions;
- Apply the necessary graph theory, mathematics, and modeling skills needed to develop and work with a network model;
- Use existing ecosystem network models and apply Ecosystem Network Analysis using enaR and EcoNet; and
- Describe and apply the requisite thermodynamic principles as they pertain to modeling and ecosystem growth & development.
- Explain how to apply of systems ecology techniques for water resource management.

Tentative Schedule
Day 1, Introductions, System Science, Ecology, History of Systems Ecology, Primary Concepts, Tools, and Goals. Introduce Student Project Assignments.

Day 2, Review Basics of Ecosystem Functionality (mass and energy systems), Intro to Network theory, Mathematics, Network Models, Intro to Thermodynamic Foundations of Systems Ecology. Use examples from literature to demonstrate how these concepts and tools are utilized. Examples will emphasize applications in urban systems and water resource management.

Day 3, Advanced Networks (Storage, Environ Analysis, Cardinal Hypotheses, etc.) and Advanced Thermodynamics (Maximum Power, Eco-Exergy, Emergy, etc.). Use examples from literature, especially water resource management, to demonstrate how these concepts and tools are used.

Day 4, Instructor led modeling effort to demonstrate conceptual development, data acquisition, modeling tools, etc. while students follow similar path with their projects. Projects related to urban and water resource management issues, e.g., urban metabolism, nitrogen runoff, etc.

Day 5, Project presentations, discussion, final lectures from instructors and students as designed from the expressed interests of the class.