

PORTLAND STATE UNIVERSITY
Systems Science Ph.D. Program
Professor Martin Zwick
(503) 725-4987

Winter 2008
MW 4:40-6:30
Harder House 104
zwick@pdx.edu

SYSTEMS THEORY
SySc 511

SySc 511 surveys fundamental systems concepts and central aspects of systems theory. The course begins with an overview of the systems paradigm and the systems field as a whole. Topics then include introductions to set- and information-theoretic multivariate relations, dynamic systems, regulation and control, model representation and simulation; decision analysis, optimization, and game theory; artificial intelligence, complex adaptive systems. Readings draw from mathematics, the natural and social sciences, and the professional disciplines (e.g., engineering, business). The course content derives both from “classical” general systems theory, cybernetics, and operations research as well as from more contemporary systems research which is organized around the themes of nonlinear dynamics, complexity, and adaptation.

TEXTS:

1. W. Ross Ashby, *An Introduction to Cybernetics*, Chapman, & Hall, 1964 (paper; ISBN 0-416-68300-2) available at <http://pespmc1.vub.ac.be/books/IntroCyb.pdf>
2. Herbert A. Simon, *The Sciences Of The Artificial* (3rd edition), MIT Press, Cambridge, Massachusetts, 1996 (paper; ISBN 0-262-69191-4).
3. Moshe Rubinstein and Iris Firstenberg, *Patterns Of Problem Solving* (2nd Edition), Prentice-Hall, New Jersey, 1994 (cloth; ISBN 013-122706-8).
4. John Casti, *Complexification*, Harper-Collins, New York, 1995 (paper: ISBN 0-06-092587-6).
5. Supplementary xeroxed materials: obtain at Smart Copy, 1915 SW 6th, 503-227-6137.

Prerequisites: Graduate status or permission of the instructor; familiarity with calculus including simple differential equations, probability, and computer programming.

Grades will be based on the midterm (50%) and final (50%).