



Center for Curriculum Redesign

Professional Development in **Complex Systems**

Module Content

Unit 1: Fractals & Self Similarity

1.1 Introductory Fractals

1.2 Julia & Mandelbrot Sets

Project Connection 1: Using Conway's Game of Life to Model Wildfires

Unit 2: Chaotic Oscillator Models

2.1 Oscillating Patterns

2.2 Steady States

Project Connection 2: Using Conway's Game of Life to Model Predator-Prey Relationships

Unit 3: Chaotic Patterns & Strange Attractors

3.1 Small Changes, Big Impact

3.2 Patterns in the Chaos-Strange Attractors

Project Connection 3: Modeling Wildfires to Explore Anti-Fragility

Module Time: 20 hours*

Module Project: Design a Complex Systems Project for Use with Your Students

Core Concepts in this Module

- Sensitivity
- Simulation Allows for Experimentation
- Elements Interact
- Patterns & Structure
- Modeling

Competencies in this Module

- Critical Thinking
- Metacognition
- Curiosity

*Total module time of 20 hours includes both independent learning/asynchronous (~85%) and synchronous (~15%)