

## Events

« January 2016 »

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

## Upcoming event

- What is Complexity? SIO 216a Begins!

(1 day)

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## syllabus

**SIO 216A Introduction to the Physics of Complex Systems**

Winter Quarter 2016 Tu/Th 12:30-1:50PM Vaughn Hall 300

Weekly Homework/Discussion meeting will be scheduled so everyone can attend (prior to or during the first class meeting)

20 Lectures/Discussion

Weekly Homework problems in Octave (open source matlab)

Group Project

30 min presentation plus 15 min questions at end of quarter on a topic related to complex systems

Graded S/U Only (except by exception - if you need a grade)

1. What is Complexity? Approaches to and History of Complex Systems

**DYNAMICS APPROACH**

2. Nonlinearity, Dissipation, Phase Space, Attractors, Maps and Feedbacks
3. Stability of Attractors and Bifurcations
4. Patterns, Feedbacks and Emergent Behavior
5. Self-organization, Slaving and Modeling

**OPTIMIZATION AND UNIVERSALIST APPROACHES TO COMPLEX SYSTEMS**

6. Nonlinear Optimization, Simulated Annealing
7. The Brain and Neural Networks
8. Complexity & Optimization in Natural Selection: Genetic Algorithms & Boolean Networks
9. Cellular Automata
10. Complex Adaptive Systems and Artificial Life

**CHAOS, FRACTALS AND DATA ANALYSIS**

11. Fractals and Networks
12. Routes to Deterministic Chaos, Chaotic Systems
13. Nonlinear Time Series and Spatial Forecasting

**MULTI-SCALE COMPLEX SYSTEMS**

14. The Tools of Complexity and Translations
15. Hierarchical Complex Systems

**AGENT-BASED MODELING OF COMPLEX SYSTEMS**

16. Agent-Based Modeling
17. The Stock Market
18. Societal Institutions and Behavior
19. Human-Environmental Interactions
20. Summary

instructor:

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## course stuff SIO 216A

[chat rooms](#)  
[lecture notes](#)  
[homework](#)  
[group project](#)  
[final project](#)  
[background reading](#)

## course stuff SIO 216B

coming soon!