COURSE: ECONOMIC COMPLEXITY

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COURSE DESCRIPTION

Understanding the basic issues concerning complex systems and predictability. Network theory network statistical properties. The statistical features of world wide bipartite network.

LEARNING OUTCOMES

- ✓ Features of complex systems: theory and predictability properties
- ✓ Network statistical properties
- ✓ Statistical analysis of world wide exports

METHODOLOGY

Theoretical lessons and practice using Phyton and C.

ASSESSMENT

Project; weighting: 100%

OUTLINE

- > Introduction of complex systems
 - 1. what is a complex system
 - 2. predictability of complex systems and Lyapunov numbers
- > Network theory
 - 1. Network fundamentals.
 - 2. Markov chain and Page rank algorithm
 - 3. Statistical properties of random networks
 - 4. Network tolerance to external attack
 - 5. Scale free network
 - 6. Network search and Kleinberg theorem
 - 7. Small world network
- > Optimization
 - 1. Simulating annealing
 - 2. Genetic Algorithms
- > World economy as complex system
 - 1. Hidalgo Housmann approach
 - 2. Non linear approach: fitness and product complexity
 - 3. The product graph and its meaning.
 - 4. Country development and the product graph
 - 5. Causal correlation
 - 6. Country fitness and Gross Domestic Product

TEXTBOOKS

Mark Newman: Network: an introduction. UP Oxford Steven Strogatz: Nonlinear Dynamics and Chaos, Westview Press