George Mason University
Graduate Course Approval/Inventory Form

Please complete this form and attach a copy of the syllabus for new courses. Forward it as an email attachment to the Secretary of the Graduate Council. A printed copy of the form with signatures should be brought to the Graduate Council Meeting. Complete the Coordinator Form on page 2, if changes in this course will affect other units.

Please indicate:  
X NEW  
MODIFY  
DELETE

Local Unit: CSS  
Graduate Council Approval Date:

Course Abbreviation: CSS  
Number: 650

Full Course Title: PHYSICS METHODS FOR ANALYZING SOCIAL COMPLEXITY

Abbreviated Course Title (24 characters max.): PHYSICS METH SOC COMPLEX

Credit hours: 3:3:0  
Program of Record: CSS

Repeatable for Credit?

D=Yes, not within same term 
T=Yes, within the same term 
N=Cannot be repeated for credit

Activity Code (please indicate): X Lecture (LEC)  
Lab (LAB)  
Recitation (RCT)  
Studio (STU)  
Internship (INT)  
Independent Study (IND)  
Seminar (SEM)

Catalog Credit Format 3:3:0  
Course Level: GF(500-600)  
GA(700+)

Maximum Enrollment: 20  
For NEW courses, first term to be offered: Fall 2006+

Prerequisites: CSS 600 and permission of instructor

Catalog Description (35 words or less)  
Survey of complexity-theoretic tools including strange attractors, Ising models, correlation functions, ergodic theory, power spectra, meanfield theory, renormalization group. Emphasis on application to social, economic, or political systems.

For MODIFIED or DELETED courses as appropriate:

Last term offered:  
Previous Course Abbreviation:  
Previous number:

Description of modification:

APPROVAL SIGNATURES:

Submitted by:  
Prof. Claudio Cioffi-Revilla_email: ccioffi@gmu.edu

Department/Program:  
Center for Social Complexity_Date: 2/3/2004

College Committee: Date:  

Course Name and Number: CSS 650 Physics Methods for Social Complexity (3:3:0)

Catalog Description: Survey of complexity-theoretic tools including strange attractors, Ising models, correlation functions, ergodic theory, power spectra, meanfield theory, renormalization group. Emphasis on application to social, economic, or political systems. Prerequisite: CSS 600 and permission of instructor.

The purpose of this course is to examine a selection of physics methods that are applicable or potentially applicable for analyzing and understanding social phenomena. Applications include stock market fluctuations, language structure, traffic dynamics, human communication, collective behavior, social networks, warfare, and others. Emphasis is on social complexity phenomena, not physical applications, so this is not a course for students of physical science whose main interest lies in physical phenomena such as condensed matter physics, high-energy physics or other areas of physical complexity.

Syllabus Topics:
Self-generated social complexity
Examples of social complexity
Overview of mathematical methods
Strange attractors in social dynamics
Social statistical mechanical systems
Renormalization group interpretation
Social interpretation of spin models
Non-equilibrium dynamics in social systems
Correlation functions
Information theory
Phase transitions
Scaling
Power laws
Fractals
Multifractals

Reading Resources: