SYLLABUS FOR COMPUTATIONAL MODELING IN THE SOCIAL SCIENCES
POLITICAL SCIENCE L32-3011, FALL 2011

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Course Description

This course will introduce students to the theory and practice of computational modeling in social science. Computational modeling allows us to explore topics – including complexity, emergence, and dynamics – that are difficult to study using traditional analytic methods. In addition, computational techniques offer researchers and analysts a method for systematic and efficient exploration of theoretical models. This course will cover the theoretical foundations behind computational modeling in addition to offering an introduction to the design and programming of such models.

The course will meet once a week for three hours. Students will be evaluated based on homework assignments, a midterm examination, and a final project in which they design and implement their own computational model of a social, political, or economic phenomenon of their choosing. This course is a prerequisite for the course "Advanced Modeling in the Social Sciences," (offered in the Spring) in which students will have the opportunity to further develop and conduct their own research with their model.

Course Textbook and Software

The required text for the course is *Micromotives and Macrobehavior* by Thomas Schelling (2006, W. W. Norton Press). The required software for the course is *Mathematica*, which is available in a standard student edition as well as more inexpensive year-long and semester-long editions at the Wolfram website.

Course Outline

Each class session will begin with a brief lecture about a theoretical topic for which computational modeling is useful, after which one or two students will be selected to offer a short discussion their results from the previous week's assignment. After this we will present a new assignment based on the lecture, and the remainder of the class will consist of directed work on the beginning of the week's assignment. The topics of the class sessions are as follows:

Class Schedule			
Class		Topic	Assignment
1	(9/12)	What is Computational Modeling?	Zombies
2	(9/19)	Complexity: Schelling, Ch. 1	Standing Ovation
3	(9/26)	Emergence: Schelling, Ch. 2	*El Farol*
4	(10/3)	Self-Organization: Schelling, Ch. 3	Auditorium Filling
5	(10/10)	Models: Schelling, Ch. 4	Coffee Pot
6	(10/17)	Thermostats & Lemons: Schelling, Ch. 5	Lemonade Stand
7	(10/24)	Agents & Motivations: Schelling, Ch. 6	Matching Pennies
8	(10/31)	Sorting: Schelling, Ch. 7	Vegetarian Zombies
9	(11/7)	Adaptation	Forest Fires
10	(11/14)	Complexity and Chaos	Game of Life
11	(11/21)	Dynamics	Sand Pile Model
12	(11/28)	Communication	Progress Report #1
13	(12/5)	Organization	Progress Report #2
14	(12/12)	Final Project Presentations	

Grading

The course grade will be based on class participation (25%), performance on the weekly assignments (25%), and both the report (25%) and poster (25%) prepared for the final project. The course grade is calculated on the traditional 10 point scale, as follows:

Score	Grade	Score	Grade	Score	Grade	Score	Grade
$\geq$94	A	$\geq$83	B	$\geq$73	C	$\geq$63	D
$\geq$90	A-	$\geq$80	B-	$\geq$70	C-	$\geq$60	D-
$\geq$87	B+	$\geq$77	C+	$\geq$67	D+	$<$60	E