



Spatial Modelling & Simulation 1

Five Sessions based on 9 Lectures Including Workshops

January 12th – February 9th, 2012

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<http://www.spatialcomplexity.info/>

List of Lecture Topics

These topics may change but I will post the lecture before each is presented. Look at the web site and continuing updates. Depending on the time, I may skip some material but it will be available for you to read on the web. The course is for 2 hours only each week, 5 weeks, 10 hours in all.

Lecture 1: What are Models: The Scientific Context: Definitions of Model and Theory: The Model- Building Process, Data Analysis to Calibration to Prediction

Lecture 2: Modelling Histories: Types and Styles: Urban Models defined, The Urban Modelling Timeline, What Kind of Cities, Examples of Three Model Types

Lecture 3: Basic Theories of Space, Social Physics and the Urban Economy: The Role of Distance in London: Examples: Von Thunen, Population Density, Gravitation



Lecture 4: Land Use Transportation Models: Gravitation and Spatial Interaction, Derivation Methods

Lecture 5: Integrated Urban Models: Some of the previous Lecture 4 is repeated with better visuals

Lecture 6: Integrated Assessment: The Tyndall Models for Greater London: Topical Issues of Climate Change and Energy Predictions in Models

Lecture 7: Cellular Automata Modelling: Principles of Cell Space Simulation

Lecture 8: Modelling Urban Morphology: Fractal Geometry, Relations to CA, and Urban Form

Lecture 9: Agent-Based Urban Models: Individual Based Models: Ideas about Dynamics and Movement: Pedestrian Models



Assignments and Workshops

We will introduce four assignments that we will work through in the workshop sessions. Two will be based on exploring population density and spatial interaction using spreadsheets while the third will be about residential location using a simple model. The fourth will be about agent-based models and will ask you to consider developing a model proposal.

We are asking each of you to form groups of 2 persons and to choose a topic from the following list of assignments, most of which will be introduced as the course of lectures progresses.

These assignments will involve you in developing for a case study different from that you are given in the workshop using data from some UK city such as London and so on which will be provided by someone like James who will also describe in more detail the assignments and presentations that you will have to make on the last day according to the schedule he will hand out.



List of Workshop Topics

1. Population Density. Working out, plotting, examining and commenting on population density variation with respect to distance in a large city using a small number of zones (~10 or so).
2. Residential or retail location modelling using a simple program provided for you, again with a small number of zones defining a large city
3. Examining population size distributions in a large city using a larger number of zones, or taking cities in UK from the Population census and examining their size and frequency
4. Exploring agent-based models using one model from the Netlogo suite of models and commenting on its structure with respect to how the model works; and then making a model proposal using ABM.



The Course Web Pages

Copies of the Powerpoints as PDFs

Lecture Readings

Assignments and Workshops

Links to Software

<http://www.spatialcomplexity.info/>

