Instructor: Ben Davies (b.davies@auckland.ac.nz)
Meeting time: Monday 9AM – 11AM in the Anthropology Spatial Analysis Lab, HSB 831
Office hours: Monday 11AM – 12PM and Wednesday 12PM-1PM

Course objectives

The first half of the course provided a background in contemporary landscape studies in archaeology, oriented around the problem of interpreting the use of fire from a landscape perspective. In that section, students learned how to critically consider how past people are connected to past landscapes, how archaeologists can both make use of data and make inferences about behaviour at the landscape scale, and how different theoretical perspectives inform on archaeological interpretations.

The second half of the course will focus on developing technical skills for dealing with spatial data. For the first six weeks, we will be focusing on the use of geographic information systems (GIS). As described by James Connolly (2008:583 in *Handbook of Landscape Archaeology*), the expansion of GIS in archaeology has been "nothing short of a revolution." In both public and academic archaeology, GIS has become a standard for displaying and analysing archaeological data. In this course, students will learn the fundamentals of GIS-based studies, including the acquisition, manipulation, analysis, and visualisation of vector and raster datasets. Case studies and lab exercises will be used to demonstrate different principles, as well give opportunities to assess strengths and weaknesses of different approaches.

During the second six weeks, we will be learning to use agent-based models (ABM). Agent based modelling is a fast growing and powerful computer simulation technology for exploring the temporal and spatial dynamics of both social and ecological systems. In this course, students will learn core ABM concepts and while developing programming skills. A set of in-class exercises, lab exercises, and case studies will be used to reinforce learning goals and provide opportunities for bridging concepts from GIS and landscape studies.

Throughout the course, readings will be assigned which will provide context for the methods we will be examining, and classes will typically begin with some discussion of the case studies. Participation in class discussions and lab exercises is compulsory for the course.

Assessment

You will be assessed in this course on three assignments: a set of weekly lab exercises (20%), a GIS-based research essay and presentation (50%), and an agent-based modelling project (30%).

Lab exercises (20%)

Most weeks there will be both an in-class lab exercise, as well as a weekly lab given at the end of the class meeting. Learning software requires practice, and these lab exercises are oriented towards acquiring proficiency in the software used in the class. At the end of each lab exercise you will be expected to provide a write-up of 2-3 paragraphs, describing what was done, how it was done, and answering any questions posed in the lab sheet. Each of the 8 lab exercises is worth 2.5% of your final grade, for a grand total of 20%. Lab write ups will be due **1 week after assignment is given**.

GIS-based assignment (50%)

You will be expected to design, conduct, and write up a unique GIS-based research project. This might be considered a stepping stone toward a more intensive postgraduate research project, or a discrete project of your own choosing. Please discuss your ideas for a project with me as soon as possible; you will need to submit an idea for your project by the end of week 2. You will present your work to the class on **Monday, 14th September** during the class period. The final essays, approximately 3000 words, will be due the following **Monday, 21st September**.

Agent-based modelling project (30%)

Each student will be required to generate a research question to be addressed by using an agent-based model, and complete an approximately 6-8 page formal Overview, Details, and Design (ODD) document for their model and research question. The assignment is due **Monday, 2nd November**. We will discuss in detail the ODD protocol during the course, but you can read more about it here: http://www.ufz.de/export/data/1/19520_ODD_Update.pdf

Software

For the GIS component of the course, we will use ESRI's ArcGIS software, particularly the ArcMap and ArcCatalog programmes. This software is available on all machines in the Anthropology Spatial Lab, HSB Room 831. You may also obtain a copy for your own personal use if you wish; please email Arts IT if you're interested.

For the agent-based modelling portion of the course, we will use the free software programme Netlogo available at https://ccl.northwestern.edu/netlogo/. Each student should download and install it on their

own computers if possible. Access will also be provided on lab computers in 831.

Week	Week of	Topic
1	20-Jul	Introduction to GIS and landscape archaeology
2	27-Jul	Getting, making, and organising spatial data
3	3-Aug	Vector data and operations
4	10-Aug	Raster data and operations
5	17-Aug	Spatial analysis
6	24-Aug	Making maps
	31-Aug	BREAK
	7-Sep	BREAK
7	14-Sep	GIS project presentations, Intro to ABM
8	21-Sep	Agent and patch behaviours and interactions
9	28-Sep	Exploratory models
10	5-Oct	Debugging and describing agent-based models
11	12-Oct	Integrating GIS and other datasets
12	19-Oct	Analysing outputs