ANTH 310: GIS and Spatial Analysis for Archaeology
Gettysburg College
Spring, 2005
WF 9:20-11:50 Lecture & Lab

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Office Hours: Wed 12-1, Tu Th 4-5:30 or by appointment

The growing use of Geographical Information Systems (GIS) among anthropologists has transformed both the way we carry out research and conceive of space. Computer manipulation of spatial data enables anthropologists to explore new models for socio-cultural, economic, and political uses of landscape and environment. Spatial technology can also play an important role in anthropological research design, from data collection and management to analysis and presentation. In order to employ this technology properly, however, the nature and limitations of spatial datasets and the strengths and weaknesses of GIS software must be considered in relation to the questions we seek to answer.

This course introduces students to the use of GIS in anthropology with attention to archaeological applications. Readings and assignments draw upon research examples from a broad range of theoretical, analytical, and geographical contexts. Emphasis is placed on understanding the ways in which anthropological archaeologists have employed GIS as part of the multi-step process of generating evidence to assess their hypotheses. As part of the coursework, each student will be required to select a spatial dataset and formulate a research design which links a question about past behavior to material expectations, data analysis, and methods for evaluation using GIS.

Class sessions consist of a lecture/discussion component and a laboratory session. Weekly topics and exercises cover: (a) the background, definitions, and concepts of GIS and spatial data, (b) approaches to the use of GIS in anthropological archaeology, and (c) hands-on experience applying analytical concepts and software to real-world data. The course does not require previous knowledge of GIS. Students are encouraged to learn specific software procedures by working with data and solving spatial problems in order to become creative and effective users of this powerful research tool.

Texts, Readings, and Software

*Spatial Technology and Archaeology: the Archaeological Applications of GIS*
Authors: Wheatley, D. and M. Gillings.
Published: London ; New York : Taylor & Francis, 2002

Many of the readings are articles or short selections from books and we will therefore discuss on the first day of class how to make the readings available to all.

Arcview 3.2/3 or ArcGIS 8/9 will be supported in class, however students may opt to use alternative software packages such as IDRISI or GRASS.

Other Useful Books:


**Course Requirements**

- Upper level undergraduate standing
- Weekly discussion questions and lab exercises
- Research design for a term GIS project
- Class presentation and write-up of term GIS project
- Active participation in class discussions

**Course Grade**

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Participation</td>
<td>10%</td>
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<tr>
<td>Reading Responses</td>
<td>10%</td>
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<tr>
<td>(collected after discussion)</td>
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<tr>
<td>Labs</td>
<td>20%</td>
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<tr>
<td>Project Presentation</td>
<td>20%</td>
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<tr>
<td>Project Report</td>
<td>40%</td>
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**Course Policies and Student Responsibilities**

You are responsible for all assigned readings, handouts, material covered in class lecture, discussion, and small group discussions, all email communications, materials posted on Blackboard, and the information contained in all films or slides shown. All students are expected to have access to email, CNAV, Blackboard, and the web.

**Attendance**

I expect you to be in class throughout the semester. Missed classes will inevitably lower your grade for class participation.

**Reserves**

Materials on reserve are as important as the readings assigned in the books you purchased at the bookstore. Print out copies of the readings as soon as possible.

**Late Work**

The due dates for assignments is listed above. I do not give make-up tests unless something truly serious has happened, such as a severe illness or death in the family. Written work is due in class unless otherwise specified on the assignment description. Written work turned in late will receive a reduced grade.

**Honor Code**

The Honor Code applies to all work done for the course and applies equally to individual and group work. This means, at a minimum, that the work you turn in will be the product of your own research, thought, effort, and writing, and that you give proper credit to the ideas and work of others through appropriate citation practice.

**Disabilities**

Students with a learning or physical disability which may affect performance in the course should come and see me as soon as possible.
Course Schedule and Topics
(subject to addition or correction as needed)

Week 1: GIS and Anthropology

Jan 14: Introduction and overview

Week 2: Frameworks for Archaeological Evidence

Jan 19: Discussion and expectations for individual & group projects

Jan 21: Lab - Research design, hypothesis development, data collection, analysis and assessment. Group project development.

Reading:


Browse:
Burgundy Project webpage:
http://www.informatics.org/france/france.html

Week 3: Spatial Thinking and Models of Space in Anthropology

Jan 26: Discussion and software start-up; Week 2 Lab due

Jan 28: Lab - Introduction to GIS, what it is, how it works, how to turn it on, geographical earth models - coordinate systems, projections, and datums.

Reading:
Wheatley and Gillings 2002: 1-21


Browse:

**Week 4: Archaeological Collection of Spatial Data A -- The Computer Database**

Feb 2: Discussion and database design; Week 3 Lab due

Feb 4: Lab - Spatial data and data structures, spatial and non-spatial databasing, vector and raster representation of data, tables linked to spatial data, sources of data on the internet.

**Reading:**
Wheatley and Gillings 2002: 23-58


**Week 5: Archaeological Collection of Spatial Data B -- The Field**

Feb 9: Discussion and GPS group projects; Week 4 Lab due

Feb 11: Lab - GPS entering field data, editing vector and raster information, georeferencing and digitizing.

**Reading:**
Wheatley and Gillings 2002: 59-87


Browse:
**Week 6: Multiple Concepts of Landscape**

Feb 16: Discussion and Lab - Simple vector and raster based spatial analysis, database queries, field summaries, overlays, map algebra.; Week 5 Lab due

Feb 17: ***Research Project Proposal DUE*** ***in my office by 5:30 pm.***

Feb 18: READING DAY

**Reading:**
Wheatley and Gillings 2002: 89-106


**Week 7: Perceived, Cognitive, and Non-Geographic Spaces**

Feb 23: Discussion and elevation model practice; Week 6 Lab due

Feb 25: Lab - DEM generation and simple topographical data, visualization analysis, 3-D techniques, and “rubber sheeting”.

**Reading:**
Wheatley and Gillings 2002: 107-124, 201-216


**Week 8: Socio-Spatial Scale and Multi-Scale Analysis**

March 2: Discussion and introduction to spatial analysis; Week 7 Lab due
March 4: Lab - archaeological approaches to regional, intra-regional, and intra-site spatial analysis including site size histograms, rank-size plots, nearest neighbor analysis, spatial distribution and distance measures, and density surfaces.

Reading:


Week 9: Networks, Interaction, and Mobility

March 9: Discussion and surface generation; Week 8 Lab due

March 11: Lab - cost-distance, friction surfaces and simple network analysis.

Reading:
Wheatley and Gillings 2002: 147-159


Week 10: Inhabiting the Social and Productive Environment

March 16: Discussion and practice examining environments; Week 9 Lab due

March 18: Lab - site catchment analysis, environmental reconstruction, boundaries and territories, Thiessen polygons for allocation.

Reading:
Wheatley and Gillings 2002: 159-164


**Browse:**
http://www.arch-ant.bham.ac.uk/research/vince/contents.htm

**WEEK 11: Spring Break**

March 23 - Spring Break!!

March 25 - Spring Break!!

**WEEK 12: Map Production & Presentation**

March 30: Lab - Making “pretty” maps, map creation and output; Week 10 Lab due

April 1: Society for American Archaeology Meeting – Independent lab time


**Week 13: Resource Landscapes and Locational Strategies**

April 6: Discussion and practice with simple modeling techniques; Week 12 Lab due

April 8: Lab - Predictive and locational modeling.

**Reading:**
Wheatley and Gillings 2002: 165-181


**Week 14: Macro-Features and Anthropogenic Environments**

April 13: Discussion and techniques for remote sensing of landscapes; Week 13 Lab due

April 15: Lab: Remote sensing and simple image processing, data types, availability and registration, examples of spectral enhancement, working with band ratios, classification techniques.

**Reading:**


**Browse:**

Internet Resources for Information and Data:
[http://www.ccrs.nrcan.gc.ca/ccrs/learn/learn_e.html](http://www.ccrs.nrcan.gc.ca/ccrs/learn/learn_e.html)
[http://www.ghcc.msfc.nasa.gov/archeology/archeology.html](http://www.ghcc.msfc.nasa.gov/archeology/archeology.html)

**Week 15: Contours of the Future**
April 20: Discussion of GIS, anthropological theory, and future research; Week 14 Lab due

April 22: Lab - Non-traditional and imaginative uses of GIS in anthropology.

**Reading:**


**Week 16: Student Project Presentations**

April 27: Students present their independent projects, (15-20 minutes each)

April 29: Students present their independent projects

**EXAM DAY** – Student Project Report Due (20 pages text, 5+ pages graphics)