

**ANTHSCI 149B/208:
DIGITAL METHODS IN ARCHAEOLOGY**

Winter 2008

Wallenberg Hall 120, TTh 9-10:50 am

Instructor: Daniel Contreras

Overview

This is a course on digital technologies in archaeology, especially as they are used for documentation, visualization, and analysis of archaeological spaces and objects. More and more, archaeologists are making use of the rich range of available digital means for depicting and exploring the archaeological record. This really represents a new class of evidence that has been enabled by the microcomputer, and the attendant means of data capture – digital survey and mapping instruments, digital video and photography, and of course, scanning.

Any use of digital methods for archaeological work has two fundamental needs:

1. the collection (or conversion) of data in formats that are compatible with digital methodologies
2. problem-oriented questions and analytic methods that are compatible with the data and tools at hand

The use of digital methods also prompts a series of questions. How do we go about the ‘process’ of collection of digital data and its manipulation (often into models) and display? How do we argue, test, convince with digital products – when do we know that we, or others, are right from graphic-based evidence? These questions point to the fundamental challenge of digital methods in archaeology, and a chief preoccupation of this course: How can we use digital methods to do more than simply produce pretty pictures and give sexy presentations? This is not the business world: we’re after intellectual content. Is there, in fact, intellectual hay to be made using digital methods in archaeology? How?

This course will attempt to take on the aspects mentioned above, but has a primary goal of achieving some level of competence through instruction, interaction and sharing of expertises and experiences, and actual generation of data and model-building. The idea of models is key to this course, models being representations of reality that usually have a claim to being understandable on a better, or more practical, level than the actual subject of study. In this case, of course, the models will tend to be visual, and themselves a combination of objective evidence and interpretive overlay.

The quarter will be structured, roughly, in two parts: data acquisition and data manipulation and analysis. In the first half we will address various means of acquiring digitally manipulable data, looking at how to use the technologies involved and how to understand the formats in which they output data. In the second half we will turn to software for the manipulation and analysis of data.

	<u>Readings*</u>	<u>Topic</u>	<u>Exercise</u>
<i>I. How do we obtain digital data?</i>			
8 Jan		Intro; Definitions, Digital Cameras and	

		Scanners	
10 Jan	<ul style="list-style-type: none"> •Eiteljorg 2000 •Gettysburg Address •Conolly and Lake 2006:77-89 	More digital images; Digitizing published data; Georeferencing <i>Corel, ImageJ, Didger, and ArcScan</i>	Digitizing
15 Jan	<ul style="list-style-type: none"> •Howard 2007:1-11 	Theodolite/Total Station; Metadata <i>Surfer</i>	
17 Jan		Theodolite/Total Station	Surfer
22 Jan		Theodolite/Total Station	Surfer II
24 Jan	<ul style="list-style-type: none"> •Howard 2007:Ch.6 "Using Recreational GPS" 	GPS <i>GPSU, DNR Garmin</i> Project proposal due	
29 Jan	<ul style="list-style-type: none"> Ristevski 2006 CyArk at Chavín 	Laser Scanning Applying Digital Methods (Guest: John Rick, Anthropology)	
31 Jan	<ul style="list-style-type: none"> •Shaw 2003 •Tripcevich 2004 	GPS and Mobile GIS (Guest: Nico Tripcevich, Berkeley ARF)	GPS
5 Feb	<ul style="list-style-type: none"> •Conolly and Lake 2006:64-77 	Remote Sensing Google Earth	
7 Feb		Publicly-available spatial data (Guests: Mindy Syfert and Julie Sweetkind-Singer, Branner Library)	Mining public data
II. What do we do with digital data?			
12 Feb	<ul style="list-style-type: none"> •Rick and Hart 1997 •Exploring Chavín de Huántar •Bienias 2006 	Panoramic VR	
14 Feb		Photogrammetry <i>iWitness/Photomodeler</i>	
19 Feb	<ul style="list-style-type: none"> •Eisenbeiss et al. 2005 	Photogrammetry	Photogrammetry
21 Feb	<ul style="list-style-type: none"> •Wheatley and Gillings 2002:3-18 •Eiteljorg and Limp 2007:106-114 •Optional: Conolly and Lake 2006:Ch.2 	GIS <i>ArcGIS</i>	
26 Feb	<ul style="list-style-type: none"> •Wheatley and Gillings 2002:23-35 	GIS	GIS Building
28 Feb	<ul style="list-style-type: none"> •Katsianis et al. 2007 	GIS	
4 Mar		GIS (Guest: Ian Robertson, Anthropology)	GIS Analysis

6 Mar	• Eiteljorg and Limp 2007:Ch.V	CAD <i>SketchUp, Microstation, IntelliCAD</i>	
11 Mar	• Losier et al. 2007	CAD	CAD
13 Mar		Project Presentations <i>Project Due</i>	

*All readings not directly linked here are available on [Coursework](#).

Class Requirements

Readings:

There are no texts for this course, as no one book captures the array of material we'll cover. Instead we will use a variety of articles (primarily examples of employment of digital methodologies) and a few background chapters from a series of texts. All readings will be made available on Coursework or are available online (and linked from the online syllabus: <http://anthsci149b.stanford.edu/>). For reference, the texts from which we'll draw material are:

Conolly, J. and M. Lake

2006 *Geographical Information Systems in Archaeology*. Cambridge Manuals in Archaeology. Cambridge University Press, Cambridge.

Eiteljorg II, H. and W. F. Limp

2007 *Archaeological Computing*. Center for the Study of Architecture, Bryn Mawr, PA. <http://archcomp.csanet.org>

Howard, P.

2007 *Archaeological Surveying and Mapping: Recording and Depicting the Landscape*. Routledge, London.

Wheatley, D. and M. Gillings

2002 *Spatial Technology and Archaeology*. Taylor and Francis, London.

Software:

We will use a variety of specialized software in this course, much of which we have obtained with educational licenses; the remainder is either open-source (free) or trial versions are available. You may find it convenient to install this software on your own computers to learn and operate it, but are not required to do so (and for a few of the programs with more restrictive licenses this will not be possible). All relevant software will be installed in the Archaeology Center computer cluster. This software includes:

- CorelDRAW (use Adobe PhotoShop if you prefer)
- ImageJ
- Didger
- Surfer
- DNR Garmin (or GPSU)
- Google Earth
- iWitness
- Hugin
- ArcGIS
- SketchUp
- IntellCAD (or AutoCAD, or Microstation)

Project and Grading:

- 80% Project—scalable depending on data availability and expertise
- 10% Project Proposal (due early in quarter)
- 10% Other class requirements (see below)

Grading in this course will be primarily project-based, and projects can be group or individual, depending on the needs and utilities of students. The idea is to try to make the projects relevant to the research interests of students, so that the work done in class can potentially contribute to honors theses, dissertations, and the like. The data employed in the project may be your own, if you have a project in which you are engaged or may be harvested from published data that grabs your interest. Primary data collection (around campus, at Jasper Ridge, etc.) is also an option, and we can also provide data from one of our projects if anyone would like to work with that. Projects are expected to show comprehension and creative use of the tools learned in the course, and the scale and elaboration of the projects are expected to be commensurate with the number of people who worked on them.

Additional requirements include completion of readings and exercises, maintenance of “read-me” files, and participation in class discussions. Exercises and “read-me” files will not be graded on successful completion, but rather on the basis of engagement with the material.

A project proposal will be due at the beginning of the third week of class. In this proposal it’s critical to consider: 1) what problem-oriented analytical question you wish to address, 2) where, and how, you will collect data relevant to that question, and 3) which digital methodologies you plan to use to address your research question, and why those methods are appropriate.

Completed projects will be due at the end of the quarter; we will devote some in-class time to presentations of student work.