

**ANTH 245A**  
**QUANTITATIVE DATA ANALYSIS IN ARCHAEOLOGY**  
**THURSDAYS 2:00-4:50 PM**  
**FALL 2012**  
**PHELPS HALL 1514**

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Office Hours: Mondays 2-3 or by appt.

### I. Course Description

This course is designed as a practicum in dealing with archaeological data. As archaeologists, we go into the field with a set of research questions that we hope to address through careful excavation and analysis of the materials we recover. We identify various “things”; we describe them; we count them; we weigh them. And then we reach a point at which we must re-connect back to our original research questions by taking all of these measurements of our data and making sense of them. This stage of research is perhaps the most challenging and definitely the most critical; and learning to master it is the primary objective of the course – to metaphorically “make the rubber hit the road”.

This will not be a standard statistics course taught for the general social sciences. The nature of archaeological data is such that it does not always meet the criteria set by many formal statistical models. Instead of spending time learning statistics that are not applicable to our data, we will focus on graphical techniques, statistics specific to archaeological datasets (e.g., seriation), exploratory data analysis, and bivariate & multivariate methods. We will learn these methods by applying them to actual archaeological datasets via the use of statistical computer packages. I have found that different statistical packages have their respective strengths and weaknesses; I also believe it important to be literate in a variety of different programs. Thus, we will be using several stats packages, including MYSTAT, WINBASP, and Kintigh’s (1993) *Tools for Quantitative Archaeology* (which includes a variety of DOS-based programs).

At the end of this course, you will be equipped to:

- Use a variety of statistical and exploratory techniques for quantifying different types of archaeological data
- Make effective arguments through the use of appropriate statistics and graphics
- Assess and evaluate the quality and validity of others’ arguments
- Effectively use a variety of statistical computer packages

## II. Course Requirements

Regular attendance to class is necessary for keeping up with the material. You will be evaluated on the basis of: weekly assignments applying the concepts/methods you have learned to actual and/or simulated datasets via computer-based statistical programs, as well as a final exam. Collaborating in pairs or groups to work through the weekly problem sets is strongly encouraged.

## III. Grading

### **Grading Scale:**

A+	=	97-100	C	=	73-76
A	=	93-96	C-	=	70-72
A-	=	90-92	D+	=	67-69
B+	=	87-89	D	=	63-66
B	=	83-86	D-	=	60-62
B-	=	80-82	F	=	59 and below
C+	=	77-79			

### **Grading Components:**

- Exercises = 90% (9 exercises, 10% each)
- Participation = 10%

## IV. Course Texts

Most of the course readings will come from the following four books. All represent key texts in archaeological data analysis, and should become part of your permanent library. There will also be additional readings, both methods and case studies. The additional readings are PDFs and are uploaded onto Gaucho Space for download (please note that this is the only way I will be using Gaucho Space in this class – if you want access to the exercises, you must come to class to get them).

1. Baxter, M. J., 1994, *Exploratory Multivariate Analysis in Archaeology*. Edinburgh University Press, Edinburgh. (only need chapters 5 & 6, which are scanned as PDFs and uploaded to Gaucho Space)
2. Cleveland, William S., 1994, *The Elements of Graphing Data*. AT&T, Hobart Press, New Jersey.
3. Drennan, Robert D., 2010, *Statistics for Archaeologists: A Commonsense Approach*. Springer, New York..
4. Shennan, Stephen, 1997, *Quantifying Archaeology*. University of Iowa Press, Iowa City.

## V. Course Topics

- Basics of data presentation → graphs, charts, and tables
- Sampling Strategies
- Seriation and Chronology
- Diversity Analysis
- Inferential Statistics (e.g., chi-square, t-tests, etc.)
- Bivariate Analysis (correlation, regression)
- Multivariate Analysis (correspondence analysis, principle components analysis)

## VI. Course Schedule and Readings:

### Week 1 (Thurs, Sept 27): Basics & More Basics & Visual Display

- Exercises 1 & 2
- Readings
  - Shennan, Chapters 1-4 (pp. 1-47)
  - Drennan, Chapter 1-4 (pp. 3-38)
  - Cleveland, Chapters 1-2 (pp. 1-118); just skim this

### Week 2 (Thurs, Oct 4): Data Standardization & Correlation Techniques

- Exercise 3
- Readings
  - Drennan, Chapter 5
  - Shennan, Chapters 6, 8
  - Speth and Johnson, 1976, Problems in the use of correlation for the investigation of tool kits and activity areas. In *Cultural Change and Continuity*, edited by C. Cleland, pp. 35-57.
  - Cowgill, George, 1990, Why Pearson's  $r$  is not a good similarity coefficient for comparing collections. *American Antiquity* 55(3): 512-520.

### Week 3 (Thurs, Oct 11): Linear Regression

- Exercise 4
- Readings (Regression Analysis & More on Correlation)
  - Drennan, Chapters 15, 16
  - Shennan, Chapters 8, 9

### Week 4 (Thurs, Oct 18): Tests of Significance

- Exercise 5
- Readings
  - Drennan, Chapters 12-14
  - Shennan, Chapters 5-7

### Week 5 (Thurs, Oct 25): Diversity Analysis

- Exercise 6
- Readings
  - Kintigh, Keith, 1984, Measuring archaeological diversity by comparison with simulated assemblages. *American Antiquity* 49(1):44-54.
  - Rhode, David, 1988, Measurement of archaeological diversity and the sample-size effect. *American Antiquity* 53(4):708-716.
  - Kintigh, Keith, 1989, Sample size, significance, and measure of diversity. In *Quantifying Diversity in Archaeology*, edited by R. D. Leonard and G. T. Jones, pp. 85-91. Cambridge University Press, New York.
  - Baxter, M. J., 2001, Methodological Issues in the study of assemblage diversity. *American Antiquity* 66(4):715-725.

Week 6 (Thurs, Nov 1): Sampling Strategies

- Exercise 7
- Readings
  - Drennan, Chapters 7-9
  - Shennan, Chapter 14
  - Redman, Charles, 1974, Archaeological sampling strategies. *Addison-Wesley Module 55*.
  - Redman, Charles, 1987, Surface collection, sampling, and research design: a retrospective. *American Antiquity* 52(2):249-265.

Week 7 (Thurs, Nov 8): NO CLASS – Southeastern Archaeological Conference!Week 8 (Thurs, Nov 15): Multivariate Analysis

- Exercise 8
- Readings
  - Baxter, Chapters 5 & 6 (PDF title is Baxter CA & PCA)

Week 9 (Thurs, Nov 22): NO CLASS – Thanksgiving!Week 10 (Thurs, Nov 29<sup>th</sup>) Seriation Analysis (GUEST INSTRUCTOR GREG WILSON)

- Exercise 9
- Readings
  - Cowgill, George, 1972, Models, methods and techniques for seriation. In *Models in Archaeology*, edited by D. Clarke, pp. 381-424.
  - Marquardt, William, 1978, Advances in archaeological seriation. *Advances in Archaeological Method and Theory* 1:266-314. **(PDFS 1978a & 1978b)**
  - Duff, Andrew, 1996, Micro-seriation: types or attributes? *American Antiquity* 61(1):89-101.

Week 11 (Thurs, Dec 6<sup>th</sup>) – Yes, there is a week 11! – A Tutorial in Using Adobe Illustrator

- No exercises
- No readings