

**FS 22**  
Archaeometrics: Diggin' Stats  
Fall 2009

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Who: Jim Bentley Office: 227 AHN (ext. 8621) Home: 909-484-6848  
When: 11:00–12:20 TTh  
Where: AHN 216  
Text: Many, but none required.

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**DESCRIPTION AND GOALS:** Archaeometrics is the application of mathematics and statistics to models in archaeology. The field of archaeology, as carried out in the Middle East, has traditionally been non-quantitative. Information (data) from digs remains locked in field notes for years. Inferences, when made, rarely consider the quality of data or model under which the data was collected. Using examples from archaeological excavations in Israel and other countries in the Middle East, we will explore the process and reasoning of biblical archaeology.

Archaeometrics will show you how statistical reasoning can be applied to topics outside of areas like biology, psychology, and education. After completing the course, you should be able to take a body of data from the ancient world and determine limitations of conclusions that can be drawn from it as well as evaluate the validity of any presented analyses. Using existing data and based on outcomes of proper methodology, you will be able to make appropriate inferences as to the nature of the associated ancient civilization. Given a priori hypotheses, you will be able to determine sources of, and strategies for collecting, data that should be gathered in future excavations. In short, you will be shown the tools that Indiana Jones really should have been using as he plundered his way through history.

**PROPOSED TOPICS:**

- *Determining “the” question.* It is difficult to find “the” answer if one does not have a well formed question. A look at the types of questions that can be answered using statistics.
- *Designing an experiment or study.* Determination of hypotheses and the structure of comparative experimentation. Strengths and weaknesses of observational studies.
- *Data collection and maintenance.* What data is (written documents, sherds, geospatial information, etc.) will be addressed. We will learn that not all data is numerical. The way data is collected affects our ability to answer the question(s) that we have posed. The use of randomization, stratification, and other sampling techniques will be discussed. Sampling bias will be addressed.

- *Sources of measurement error (variability) and data integrity will be addressed.* The detection of anomalous (outlier) and influential observations will be covered.
- *Techniques for analyzing data.* Both descriptive and inferential methodologies will be addressed. The focus here will be on moving beyond the traditional t-test and into methods that are appropriate for the type of data collected and which allow for controlling for other factors, thus better addressing “the” question.
- *Interpretation and communication of the results.* We will spend a great deal of time working on improving our statistical (quantitative) reasoning and learning how to write and verbally communicate technical ideas to non-statisticians. We will also learn to communicate with a trained statistician using the language of statistics.

GRADING:

- 15% Class participation (in discussions and in-class activities) and attendance.
- 60% Three individual projects
  - with team data collection
  - and individual reports
- 25% One group term project
  - with team oral presentation
  - and a group written report

OFFICE HOURS: MWF 10:00-11:00, 12:20-1:00 and TTh by appointment. (During lunch reduces conflicts since there are a very limited number of classes that meet during this time). These are times when I will be in, or near (*eg.* in the computer lab or near the xerox machine) my office. I’ll be around at other times, so if my door is open and nobody else is getting help, knock and then come on in. If I’m busy I’ll ask you to come back at another time. Don’t be offended, just come back later.

ATTENDANCE: You are encouraged to attend all class sessions. Statistics, like many sciences, is cumulative in nature. Missing material affects your ability to understand later topics. If you must miss a class, be sure to get notes and homework assignments from a classmate. There will be a number of in-class activities scattered throughout the semester. Missing these activities will adversely affect your understanding and your grade.

The last day to drop or change your grade status is Friday, October 16. Fall Break is Saturday, October 10 through Tuesday, October 13. Thanksgiving Break is Wednesday, November 25 through Sunday, November 29. The scheduled final for this class is Wednesday, December 16 at 3:00.

ACADEMIC HONESTY: Please familiarize yourself with the University’s policy on academic honesty (see the Catalog). You are encouraged, and sometimes required, to work together. However, it is expected that the work you turn in on individual assignments and exams will be yours alone. If there is evidence that you have copied any part of your work, you will be subject to University disciplinary action for plagiarism.