Syllabus

Rutgers University
Analysis of Archaeological Data 070:335 Spring 2010

Course Topic: Quantitative Methods in Evolutionary Anthropology

PROFESSOR:
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INTRODUCTION

As scientists and evolutionary anthropologists, our job is to find stuff out and to answer questions. This class is about how to do that using quantitative approaches (counting, measuring, assessing probability).

MATERIALS

There is no required text for the course. Instead readings from the primary literature and selected texts available in pdf format will be used. Many readings will come from *Introductory Statistics for the Behavioral Sciences* by Young and Veldman. We will also use other resources available online and elsewhere. These will be available as needed on sakai.

LEARNING GOALS

- Be able to describe the scientific method. What is an observation, hypothesis, prediction, test of a hypothesis?

- Identify the key earliest steps in formulating a research problem or question.

- Explore approaches to reading papers and methods in general. How do we read the primary scientific literature? What is the primary scientific literature?

- Make practical decisions about the flow of data in a project. (What is data, observation, measurement, a variable?).

- Identify criteria useful in deciding "what to do and what to test?"

- Achieve mastery of some basic descriptive methods. Read various kinds of graphs and charts. Understand means, standard deviations. What is variance, central tendency, skewness?

- Be introduced to the concept of probability (what is a "p-value"?).

- Answer the question "what is random?"

- What do we mean by parametric and non parametric methods in statistics?

- What is correlation? What is regression?

• Be introduced to basic inferential statistics: the t-test, ANOVA, chi-squared.

• Learn what "dimension reduction" is and for what multivariate statistic might be useful.

• Work with some real data.

• Answer the question "What is "goodness of fit"?

• Explore resampling approaches to questions.

• Be able to describe the multiple comparison problem.

COURSE STRUCTURE

This course is meant to be an introduction to quantitative methods. These include descriptive statistics and more common and basic inferential statistics. These methods are, however, not useful without a good understanding of what a scientific question is and what the primary scientific literature is. Thus these two issues will be recurrent themes in the course. Each student will also have the opportunity to work with some already published data.

GRADING

Grading will be based on six class assignments (~20%), classroom participation (~10%), two midterm exams (~20% each), and a final exam (~30%).

ASSIGNMENTS AND CLASS DISCUSSION

Each week's classes will be structured around required readings and/or one or more short assignments or exercises. Each class meeting will include some lecture as well as class discussion. Be sure to check Schedule on sakai before each class for detailed instructions on how to prepare for class.

SCHEDULE OF TOPICS

DATE	TOPICS	DUE
21-Jan	First class; What is a question and why do we care?	
26-Jan	What is the primary scientific literature?; How do people read the primary literature?	
28-Jan	What is "data"?; What are "stats"?	
2-Feb	Random numbers and distributions	Assignment # 1
4-Feb	Methods of data collection; Sample composition	
9-Feb	Descriptive statistics I; Pretty pictures; Central tendency	
11-Feb	Descriptive statistics II; Variability; Skew; Kurtosis	Assignment # 2
16-Feb	The comparative method; What is an inferential statistic?; What is a "test"?	
18-Feb	Probability	
23-Feb	**Midterm I**	
25-Feb	Inferential statistics	
2-Mar	Parametric statistics	
4-Mar	Student's t-test	Assignment # 3
9-Mar	ANOVA, Part 1	
11-Mar	ANOVA, Part 2	Assignment # 4
16-Mar	NO CLASS (Spring Break)	
18-Mar	NO CLASS (Spring Break)	
23-Mar	Chi-squared	Assignment # 5
25-Mar	Potential pitfalls in any analysis	
30-Mar	Correlation	
1-Apr	Regression	Assignment # 6
6-Apr	**Midterm II**	
8-Apr	Non-parametric statistics	
13-Apr	Brute-force methods: The marvelous world of resampling	
15-Apr	NO CLASS	
20-Apr	What are multivariate statistics?	
22-Apr	What is "dimension reduction"?	
27-Apr	What did Dr. Gordon and colleagues do? A case study relating to the Flores hominin skull	

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29-Apr <u>Review day</u>
 7-May **<u>Final Exam</u>**

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