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ANTY 401.01: Anthropological Data Analysis

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ANTHROPOLOGY 401
ANTHROPOLOGICAL DATA ANALYSIS
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This course is designed as a one-term introduction to how anthropologists use quantitative analysis to solve their problems of interest. I concentrate on conceptualization and interpretation of quantitative results and hope to promote critical thinking.

The course is assessed on your final ability to do four things:
➢   solve anthropological problems involving quantitative data;
➢   your understanding of quantitative reasoning;
➢   your ability to write clear and appropriate explanations of quantitative results; and,
➢   your ability to choose appropriate techniques to analyze anthropological data from simple data sets.

These expectations are appropriate because they increase the chances that you will be able to independently evaluate and understand quantitative concepts in monographs and journal articles. You will also be able to analyze data from your own research using quantitative techniques. Experience tells me that you will enjoy this course. My style is informal, personal, yet rigorous. The following explains in more detail what you will be able to do at the conclusion of this course and presents a course outline:

1. Introduction
➢   Distinguish between descriptive and inferential statistics.
➢   Define population, sample, parameter, statistic and variable as used in this course.
➢   Distinguish between quantitative and qualitative variables.
➢   Identify lower and upper limits of a quantitative measurement
➢   Define independent variable, dependent variable, and extraneous variable

2. Organizing data
➢   Arrange data into simple and grouped frequency distributions
➢   Execute and describe frequency polygons, histograms, bar graphs and line graphs
➢   Describe distributions based on shapes

3. Central tendency of distributions
   - ➢ Find mean, median and mode of a simple frequency distribution
   - ➢ Find mean, median and mode of a grouped frequency distribution
   - ➢ Determine whether a measure is a statistic or parameter
   - ➢ Determine which central tendency measure is most appropriate for a data set
   - ➢ Determine skew of a frequency distribution
   - ➢ Find the mean of a set of means

4. Variability of distributions
   - ➢ Explain the concept of variability
   - ➢ Find range of a distribution
   - ➢ Distinguish between variability measures of populations and samples
   - ➢ Calculate and explain standard deviation of a population
   - ➢ Calculate and explain standard deviation of a sample
   - ➢ Calculate and explain variance of a distribution
   - ➢ Transform raw scores to z scores
   - ➢ Use z scores to compare two scores in a distribution
   - ➢ Use z scores to compare a score in one to a score in another distribution

5. Relationships between variables–correlation and regression
   - ➢ Explain the difference between univariate and bivariate distributions
   - ➢ Explain the concept of correlation
   - ➢ Draw scatter plots
   - ➢ Explain the difference between positive and negative correlation
   - ➢ Compute a Pearson product-moment correlation coefficient (r)
   - ➢ Interpret correlation coefficients
   - ➢ Identify situations in which the Pearson r will not accurately reflect the degree of relationship
   - ➢ Name and explain the elements of the regression equation
   - ➢ Compute regression coefficients and fit a regression line to a set of data
   - ➢ Make predictions for one variable from measurements of another variable

6. Theoretical Distributions
   - ➢ Distinguish between a theoretical and an empirical distribution
   - ➢ Distinguish between theoretical and empirical probability
   - ➢ Predict the probability of events based on knowledge of theoretical distributions
   - ➢ List characteristics of a normal distribution
   - ➢ Find proportion of normal distribution that lies between two scores
   - ➢ Find scores between which a certain proportion of normal distribution lies
   - ➢ Find the number of scores associated with a proportion of a normal distribution

7. Sampling Distributions
➢ Define a sampling distribution and a sampling distribution of a mean
➢ Describe the Central Limit Theorem
➢ Describe the effect of sample size on standard error of the mean
➢ Use z-scores to find probability that sample mean was drawn from a population mean
➢ Describe the t distribution
➢ Know when to use normal distribution and when to use t distribution
➢ Calculate confidence intervals using normal distribution and interpret
➢ Calculate confidence intervals using t distribution and interpret
➢ Define random sampling and obtain one given a set of data
➢ Define and identify biased sampling methods

8. One sample hypothesis testing–ratio and interval scales
➢ Explain hypothesis testing
➢ Define null hypothesis
➢ Define three alternative hypotheses
➢ Define alpha, significance level, rejection region and critical value
➢ Use t test to decide if a sample mean came from a certain population
➢ Decide if a sample r came from a certain population

9. Two sample test–ratio and interval scales
➢ Describe the logic of controlled comparison
➢ Explain the testing of a null hypothesis when there are two samples
➢ Explain the reasoning behind degrees of freedom
➢ Distinguish between independent samples and correlated samples
➢ Calculate t-test values for comparing means of independent samples
➢ Calculate t-test values for comparing means of correlated samples
➢ List and explain assumptions for using t tests
➢

10. Analysis of Variance
➢ Identify the independent and dependent variables in a one-way ANOVA
➢ Explain the rationale of ANOVA
➢ Define F and explain its relationship to t
➢ Distinguish between a priori and post hoc tests
➢ Use the Tukey Honestly Significant Difference (HSD) test to make all pairwise comparisons
➢ List and explain the assumptions of ANOVA
➢ Calculate and interpret f, an effect size index

11. Factoral Design and One-Factor Repeated Measures
➢   Define the terms factorial design, factor, level, and cell
➢   Name the sources of variance in a factorial design
➢   Describe the concept of interaction
➢   Interpret Interactions and main effects
➢   List the conditions required for a factorial design ANOVA

12. Chi Squared Distribution
➢   Identify the kind of data that requires a chi squared test for hypothesis testing
➢   Distinguish between goodness of fit tests and tests of independence
➢   For goodness of fit: state null hypothesis and calculate and interpret chi squared
➢   For independence tests: use and interpret chi squared

13. Relationships involving ordinal scaled variables
➢   Describe rationale of nonparametric statistical tests
➢   Perform Mann-Whitney U test and interpret the results
➢   Perform a Wilcoxon matched-pairs, signed ranks T test and interpret
➢   Calculate a Spearman correlation coefficient and determine its significance

GRADE:

Your grade is based on a midterm examination worth 200 points and a comprehensive final examination worth 200 points for a total of 400 points. Your final grade will reflect your performance relative to your classmates. I emphasize your ability to **interpret** calculations and I will give partial credit only if you show your work.

TEXTBOOK:

Spatz, Chris
2005 *Basic statistics. Tales of distributions*. 8th edition. Thomson/Wadsworth, Belmont, CA.

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