

Statistical Methods in Anthropology

Tuesdays and Thursdays, 9.30-10.45am, Dane Smith Hall, Room 223. In addition, all students must be enrolled in the Statistics Lab held in ESCP 110 on Fridays; two sessions available, 9.00-10.50am or 12.00-1.50pm. Please attend all class and lab sessions.

Class Instructor: Marcus J. Hamilton

Contact Info: marcusj@unm.edu, office phone: 277-1869 (don't bother!)

Office Hours: Tuesdays and Thursdays after class (Anthropology Annex, B11).

Lab Instructor: Greg Zaro

Contact Info: gzaro@unm.edu, office phone: 277-5401

Office Hours: Thursdays 1-3pm Anthropology Patio 110 and by appointment

Class texts:

Leonard, R.D. and T. Van Pool. No Date. *Quantitative Methods in Anthropology*. Unpublished Manuscript. The Leonard and Van Pool manuscript together with assigned additional material will be made available at <http://www.unm.edu/~marcusj/home.htm> (follow the class link).

Rohlf, F.J. and R.R. Sokal. 1994. *Statistical Tables*. W.H. Freeman and Company.
\$32.50 new, >\$20 second hand at www.amazon.com (Optional).

We will be using is MINITAB v.8; it is not required that you have your own copy as they have in the UNM computer lab classrooms, but it might be a useful investment. The UNM bookstore sells the student version for about \$80.

Other Resources:

UNM and CSEL Libraries: There are dozens of other texts on statistics out there, some more useful than others but it is a good idea to get various perspectives, so go check them out.

The Web: There are several million statistics WebPages out there on just about everything you would want to know. Put them in your favorites/address book.

Grading Policy:

There will be ten problem sets, an in-class mid-term quiz, and a take-home final exam. Final grades will be assigned according to the following criteria, and there will be no curve.

Grade Breakdown

Problem sets: 60%
Mid-term: 15%
Final exam: 25%
Total: 100%

Final Grade = Score/100,

A=90%+,
B=80%+,
C=70%+ etc. + and – will be given where appropriate (class attendance, participation, and attitude will also be taken into consideration).

Class description:

DO NOT PANIC! Statistics are logical, straightforward, and most importantly, fundamental to understanding the world around us. Statistics are essential to many scientific disciplines, including Anthropology, as they provide the only way we have in approaching objective explanation, that is the underlying cause of patterns we recognize as meaningful relationships. Statistics are fundamentally easy and usually consist of two simple procedures; a description of the data sets involved, followed by a test of a hypothesis based on an idea of what the relationship between those data sets might be.

Anthropology is rapidly becoming a more and more quantitative discipline, as is evident by the types of papers coming out of the major journals over the last few years (AA, CA, JAS, JAA, etc.). This class provides an in depth introduction to the basic suite of statistical tools that is required for quantitative data analysis in all sub-fields of Anthropology. The emphasis of the class is to understand the logical basis, set of assumptions, and underlying mechanics of statistical hypothesis testing, with the aim that by the end of the course people will be able to manipulate simple data sets, accurately describe statistical relationships, and understand the results of published research. We will focus on both parametric and non-parametric univariate statistics, but will touch on multivariate techniques (time allowing), which are essential to manipulating more complex data sets. The class assumes no previous background in either mathematics, computing, or statistics beyond the level of basic arithmetic. In class, we will learn to carry out basic statistical tests by focusing on the more theoretical aspects of statistics using simple equations (plug and chug) to highlight the procedures, and in the labs we will focus on using MINITAB and EXCEL to manage data sets and perform the same and more complex tests. Please read the assigned chapters *before* class so that you have a background to what is being discussed, and can come armed with questions. Grading is based on statistical concepts and the ability to follow statistical procedures on paper and on the computer, not on the rote memorization of equations. Students are encouraged to attend office hours and work together on the problem sets, but all assignments must be handed in as individual pieces of work. However, the final take-home exam is to be completed individually, with no collaboration.

*****Important Points*****

1. Ten problem sets will be assigned over the semester. Due dates are final and no late work will be accepted, ever. These are to be written up formally, show all work, but be clear and concise.
 2. Read all the assigned chapters and material on the web for all classes: We will cover the majority of this material in class, but undoubtedly not all.
 3. The mid-term quiz is in class but you will be allowed a 1-page cheat sheet of equations and procedures. Statistical tables will be provided. This quiz will refer to the in-class material and the Leonard and Van Pool text.
 4. The take-home exam is comprehensive and should be taken under exam conditions.
 5. Don't worry, if you attend all classes and lab sessions, sit the exams and hand in all work you will do well!
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Schedule:

Section 1: *Introduction to Statistics*

Week 1: August 24th and 26th

Tuesday: Introduction to class

Thursday: Quantitative basics

Reading: Leonard and Van Pool Chs. 1-3.

Week 2: August 31st and September 2nd

Tuesday: Descriptive statistics

Thursday: Probability Theory I

Reading: Leonard and Van Pool Ch. 4-5.

Week 3: September 7th and 9th

Tuesday: Probability Theory II

Thursday: The Normal Distribution and Z Scores

Reading: Leonard and Van Pool Ch. 6.

Section 2: *Parametric Statistics*

Week 4: September 14th and 16th

Tuesday: Introduction to hypothesis testing

Thursday: The Central Limit Theorem

Reading: Leonard and Van Pool Ch. 7-8.

Week 5: September 21st and 23rd

Tuesday: The t distribution, t Tests and confidence limits I

Thursday: The t distribution, t Tests and confidence limits II

Reading: Leonard and Van Pool Chs. 8 and online material

Week 6: September 28th and 30th

Tuesday: The t distribution, t Tests and confidence limits III

Thursday: The t distribution, t Tests and confidence limits IV

Reading: Leonard and Van Pool Chs. 8 and online material

Week 7: October 5th and 7th

Tuesday: The t distribution, t Tests and confidence limits V

Thursday: Statistical Power and β error

Reading: Leonard and Van Pool Chs. 8-9.

Week 8: October 12th and 14th

Tuesday: **MID-TERM**

Thursday: **Fall Break**

Reading: N/A

Section 3: *Non-Parametric Statistics*

Week 9: October 19th and 21st

Tuesday: Introduction to Non-Parametric Statistics and data transforms
Thursday: Sign Tests (1 Sample Sign)
Reading: Online material

Week 10: October 26th and 28th

Tuesday: Paired Tests I (Mann-Whitney)
Thursday: Paired Tests II (Mann-Whitney)
Reading: Online material

Section 4: *General Linear Models (GLM)*

Week 11: November 2nd and 4th

Tuesday: Introduction to GLMs/ANOVA I
Thursday: ANOVA II
Reading: Leonard and Van Pool Ch. 10

Week 12: November 9th and 11th

Tuesday: ANOVA III and Bonferonni Multiple Comparisons
Thursday: Kruskal-Wallis ANOVA (non-parametric equivalent)
Reading: Leonard and Van Pool Ch. 10 and online material.

Week 13: November 16th and 18th

Tuesday: Linear Regression I
Thursday: Linear Regression II
Reading: Leonard and Van Pool Ch. 11.

Week 14: November 23rd and 25th

Tuesday: Linear Regression III
Thursday: **Thanksgiving**
Reading: Leonard and Van Pool Ch. 11.

Week 15: November 30th and December 2nd

Tuesday: Multiple Linear Regression
Thursday: Correlation Analysis
Reading: Leonard and Van Pool Ch. 12 and online material.

Week 16: December 7th and 9th

Tuesday: Chi-square, Spearman's Rank, and the Adjusted Residual I
Thursday: Chi-square, Spearman's Rank, and the Adjusted Residual II
Reading: Leonard and Van Pool Ch. 13.

Final: Take Home Exam (TBA)