

LING82200 & 73600  
CRNs: 36124 & 36125

Statistics for Linguistics Research (Lecture & Practicum)  
Mondays 6:30pm-8:30pm & Tuesdays 11:45am-1:45pm

SYLLABUS  
On Zoom

<b>Instructor:</b> Martin Chodorow	<b>Practicum Leader:</b> Amy Ma
<b>E-mail:</b> <a href="mailto:martin.chodorow@gmail.com">martin.chodorow@gmail.com</a>	<b>E-mail:</b>
<b>Hours:</b> TBA	<b>Hours:</b> TBA

### **Course Description:**

This course provides an introduction to parametric statistics using R statistical software with examples drawn from a variety of research areas in linguistics. Topics include descriptive statistics, t-tests, analyses of variance, linear and logistic regression, and mixed effects models.

### **Learning Objectives:** Students in the course will

- gain an understanding of the statistical concepts relevant to linguistic research,
- become proficient in analyzing linguistic data with methods based on these concepts, and
- acquire skill in using statistical software appropriate for such analyses.

### **Texts:**

**Winter, B.** (2020) *Statistics for Linguists: An Introduction Using R*. New York, NY: Routledge. ISBN 978-1-138-05609-1. (Paperback list price: \$52.95; available for \$39.84 from web vendors)

**Johnson, K.** (2008) *Quantitative Methods in Linguistics*. Malden, MA: Blackwell. ISBN 978-1-4051-4425-4. (Available in electronic form from the GC Library.)

**Baayen, R. H.** (2008) *Analyzing Linguistic Data*. New York: Cambridge University Press.

(Available for free download: <http://www.sfs.uni-tuebingen.de/~hbaayen/publications/baayenCUPstats.pdf> )

(Page numbers for Baayen shown below are for this pdf, which differ somewhat from the published book.)

### **Recommended:**

If you need to review some basics of math:

[https://www.uvm.edu/~statdhtx/fundamentals9/ArithmeticReview/review\\_of\\_arithmetic\\_revised.html](https://www.uvm.edu/~statdhtx/fundamentals9/ArithmeticReview/review_of_arithmetic_revised.html)

An R tutorial within R:

```
>install.packages('swirl')  
>library(swirl)  
>swirl()
```

A free online R tutorial:

<https://www.datacamp.com/courses/free-introduction-to-r>

Very helpful snippets of R code with examples (Quick R):

<http://www.statmethods.net/>

A reference work that provides encyclopedic coverage of a wide range of statistical topics and tests:  
Field, A, Miles, J., & Field, Z. (2012) *Discovering Statistics Using R*. LA: Sage. ISBN 978-1-4462-0046-9.

Useful videos on many statistics topics:  
<https://www.youtube.com/user/jbstatistics/videos>

VassarStats website for statistical explanation and online statistics calculators: <http://vassarstats.net/>

**Lecture Slides, Lecture Notes, Data Files, & Homework Assignments** are posted in Course Materials on Blackboard.

DATE	READINGS
08/30	<u>Overview of Statistics</u> <ul style="list-style-type: none"><li>• <b>Lecture Slides - Introduction</b></li><li>• Johnson, Chapter 1, “Fundamentals of Quantitative Analysis”</li><li>• <b>Chodorow, “Lecture Notes – Part 1”</b></li></ul>
08/31	<u>Introduction to R and RStudio</u> <ul style="list-style-type: none"><li>• Winter, Chapter 1, “Introduction to R”</li><li>• Winter, Chapter 2, “The Tidyverse and Reproducible R Workflows”</li></ul>
09/06	*** Classes do not meet ***
09/07	*** Classes do not meet ***
09/13	<u>Descriptive Statistics, Distributions</u> <ul style="list-style-type: none"><li>• Winter, Chapter 3, “Descriptive Statistics, Models, and Distributions”</li></ul>
09/14	<u>Data Visualization: Barplots, Boxplots, Histograms, Scatterplots</u> <ul style="list-style-type: none"><li>•</li></ul>
09/20	<u>The Binomial Test</u> <ul style="list-style-type: none"><li>• <b>Lecture Slides - Binomial</b></li><li>• <b>Chodorow, “Lecture Notes – Part 2”</b></li></ul>
09/21	<u>Differences Between Means: Sampling and Hypothesis Testing</u> <ul style="list-style-type: none"><li>• <b>Lecture Slides – Sampling Theory</b></li><li>• Johnson, Chapter 2, “Patterns and Tests” – Sections 2.1 thru 2.3.4</li><li>• <b>Chodorow, “Lecture Notes – Part 3”</b></li></ul>
09/27	<u>More Sampling and Hypothesis Testing</u> <ul style="list-style-type: none"><li>• <b>Lecture Slides – More Sampling Theory &amp; the t-test</b></li><li>• Johnson, Chapter 3, “Phonetics” – Sections 3.1 thru 3.1.5</li></ul>

- **Chodorow, “Lecture Notes – Part 4”**

09/28 t-tests, Confidence Intervals, and Power

- Baayen, Chapter 4, “Basic statistical methods” (pp. 73-91)

10/04 Tests of Differences between 2 Means

- **Lecture Slides – Testing Differences: 2 Groups, 1 Measure**
- Johnson, Chapter 3, “Phonetics” – Sections 3.1 thru 3.1.5 [again]
- Baayen, Chapter 4, “Basic statistical methods” (pp. 73-91) [again]

10/05 Effect Size, Sample Size, and Power

- **Lecture Slides – Effect Size, Power, Sample Size**

10/11 \*\*\* COLUMBUS DAY – Classes do not meet \*\*\*

10/12 Correlation

- **Lecture Slides - Correlation**
- Johnson, Chapter 2, “Patterns and Tests” – Sections 2.4 thru 2.4.1
- Baayen, Chapter 4, “Basic statistical methods” (pp. 94-98)

10/18 Simple Linear Regression

- **Lecture Slides – Simple Linear Regression**
- Johnson, Chapter 2, “Patterns and Tests” – Sections 2.4.2 thru 2.4.3
- Baayen, Chapter 4, “Basic statistical methods” (pp. 91-110)

10/19 Simple Linear Regression - Assumptions & Diagnostics

- Winter, Chapter 4, “Introduction to the Linear Model: Simple Linear Regression”
- bw\_LME\_tutorial1.pdf (available on Blackboard)

10/25 Analysis of Variance

- **Lecture Slides – One-way Analysis of Variance**
- **Lecture Slides – Tests Following ANOVA**
- Johnson, Chapter 4, “Psycholinguistics” – Section 4.1
- Baayen, Chapter 4, “Basic statistical methods” (pp. 110-117)
- bw\_anova\_general.pdf (available on Blackboard)

10/26 Factorial Analysis of Variance

- **Lecture Slides – Factorial ANOVA**
- Johnson, Chapter 4, “Psycholinguistics” – Section 4.2

11/01 Repeated Measures Analysis of Variance

- **Lecture Slides – One-way RM-ANOVA**

- Johnson, Chapter 4, “Psycholinguistics” – Sections 4.3 thru 4.3.2
- 11/02 Analysis of Variance for Other Designs
- **Lecture Slides – Factorial & Mixed Design RM-ANOVA**
- 11/08 Analysis of Variance wrap-up & review
- 11/09 Multiple Regression – part 1
- **Lecture Slides – Multiple Regression – Part 1**
  - Stevens, “Partial and semipartial correlations” (pdf on Blackboard)
  - Johnson, Chapter 3, “Phonetics” – Sections 3.2 thru 3.2.3
  - Winter, Chapter 6, “Multiple Regression”
  - bw\_LME\_tutorial1.pdf (available on Blackboard)
- 11/15 Multiple Regression – part 2
- **Lecture Slides – Multiple Regression – Part 2**
  - Winter, Chapter 7, “Categorical Predictors”
- 11/16 Multiple Regression – part 3
- **Lecture Slides – Multiple Regression – Part 3**
  - Winter, Chapter 8, “Interactions and nonlinear Effects”
- 11/22 Non-parametric Tests – Nominal and Ordinal
- **Lecture Slides – Non-parametric Tests – Nominal & Ordinal**
- 11/23 Chi-Square and Logistic Regression
- **Lecture Slides – Logistic Regression**
  - Johnson, Chapter 5, “Sociolinguistics” – Sections 5.1 thru 5.7
  - Winter, Chapter 12, “General Linear Models 1: Logistic Regression”
- 11/29 Chi-square and Logistic Regression – part 2
- 11/30 Mixed Effects Models – part 1
- **Lecture Slides – Mixed Effects – Part 1**
  - Winter, Chapter 14, “Mixed Models 1”
  - bw\_LME\_tutorial2.pdf (available on Blackboard)
- 12/06 Mixed Effects Models – part 2
- **Lecture Slides – Mixed Effects – Part 2**
  - Winter, Chapter 14, “Mixed Models 2”
- 12/07 Mixed Effects Models – part 3

12/13 Wrap-Up and Review

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Take-Home Midterm 11/02 (date subject to change)

Take-Home Final due \*\*12/21\*\*

**Grades** will be based on homework assignments (1/3), a take-home midterm exam (1/3), and a take-home final exam (1/3). Your 4 lowest homework grades (out of 11 or 12 homework assignments) will be dropped before your homework average is computed. Grading scale: A(+ -), B(+ -), C(+ -), F.