# Syllabus
# EDUS 608: Advanced Educational Statistics
## Section 901
## Fall 2019
### Instructor: Dr. Morgan DeBusk-Lane

Email: debusklaneml@vcu.edu
Class time: Monday 4 - 6:40 pm
Classroom: Oliver Hall 3108

Phone: 8048743431
Office: Remote
Office Hours: Tues 2:004:00,
or by appointment

**Course Content**

This course provides an introduction to techniques of data analysis and statistical inference commonly used in educational, sociological, economic, and psychological research. Students will conduct analyses in SPSS (or R) using data sets such as ELS:2002, NELS:88, ECLS-K 1998-1999, and HSLS. The major topics covered include univariate and multiple regression, one and two-factor analysis of variance (ANOVA) with multiple comparisons and interactions, and logistic regression. Knowledge of basic algebra is required, as is an understanding of the fundamental principles of descriptive statistics and hypothesis testing (as covered, e.g., in STAT 508 or an equivalent). Knowledge of calculus is not required.

**Course Objectives**

By the end of the course, students should have demonstrated the ability to:

- recognize continuous and discrete (or categorical) variables and choose appropriate statistical procedures accordingly
- describe the relationship between predictor variables and a continuous outcome variable
- find point estimates and confidence intervals and do hypothesis tests for regression coefficients
- formulate multiple regression models appropriate for various research problems and interpret computer outputs relevant to those models
- delineate assumptions of linear statistical models and examine data to evaluate conformity to those assumptions
- formulate analysis of variance models, estimate their parameters, and test hypotheses about those parameters
- recognize similarities and differences between regression and analysis of variance models
- identify and control sources of error through experimental design and statistical adjustment

- identify observations which may be dependent, and explain the limitations of ordinary techniques for these data
- formulate logistic regression models for binary dependent variables and interpret and computer output relevant to those models
- write coherent summaries and interpretations of data analyzed by the above procedures

**Required Text**

Field, A. (2018). *Discovering statistics using IBM SPSS Statistics (5th Ed.)*. Los Angeles, CA: Sage Publications.

*Note:* The previous 4th edition (2013) is also acceptable, but chapter numbers may not be consistent with those listed in the syllabus.

**Instructor Website**

My website, https://rampages.us/drbstats, has a number of videos and other resources to support your learning in this class. I will try to upload a video for each new analysis we cover in class for your use as a review tool. For this course, look under the "Educational Statistics" tab.

**Optional Texts and References**

Agresti, A. & Finlay, B. (2009). *Statistical methods for the social sciences* (*4th Ed*.). New Jersey: Pearson-Prentice Hall.

Lomax, R. G., & Hahs-Vaughn, D. L. (2013). *An introduction to statistical concepts (3rd Ed.)*. New York: Routledge.

Salkind, N. J. (2016). *Statistics for people who (think they) hate statistics. (6th Ed.)* Thousand Oaks, CA: Sage Publications.

**Other Useful References**

Students over the past semesters have recommended several books that they found helpful. Most of these books offer a more "big picture" introduction to statistics. In general, these resources give a broad overview of the subject but do not go into any single topic deeply. While none of these resources would be a substitution for the course textbook, you may find them useful as additional sources. Many are available in the library or can be purchased inexpensively online, either the editions listed here or earlier editions.

Gonick, L. & Smith, W. (1994). *The cartoon guide to statistics*. New York: Harper Resource.

Kranzler, J.H. (2010). *Statistics for the terrified (5th Ed.)*. Upper Saddle River, NJ: Pearson.

Levine, D.M. & Stephan D.F. (2014). *Even you can learn statistics: A guide for everyone who has ever been afraid of statistics (3rd Ed.)*. Upper Saddle River, NJ: Pearson.

**Statistical Software**

SPSS will be the core software package used in this course. SPSS is a Windows package that is primarily menu-driven and is the software that will primarily be used to illustrate analyses during the lectures. The current version of SPSS is IBM SPSS 26.

SPSS software can be downloaded for free for VCU students. The link to download is below:

https://ts.vcu.edu/askit/research-math-science/spss/

It is not assumed that you are proficient in SPSS but that you will gain the necessary skills by studying the material in the textbook, in the lecture notes, and through practice in class. If you need to learn more about SPSS, there are a number of resources that you may find helpful:

George, D., & Mallery, P. (2016).  *IBM SPSS Statistics 23 step by step (14th Ed.).*  London: Routledge.
Green, Samuel B. and Salkind, Neil J. (2013). *Using SPSS for Windows and Macintosh: analyzing and Understanding data (7th Ed.)*. Upper Saddle River, NJ: Pearson.
Pallant, Julie (2016). *SPSS survival manual: A step by step guide to data analysis using SPSS (6th Ed.)*. Open University Press.
UCLA Academic Technology services webpage: http://www.ats.ucla.edu/stat/spss/

**Evaluation**

Grades will be based on a weighted average of student performance in the following four areas. There will be five homework assignments, a midterm, and a final.  Weights are as follows:

| | |
|---|---|
| Midterm Exam | 25% |
| Final Exam (scheduled time only) | 25% |
| Homework assignments (equal weight for each) | 40% |
| Class attendance and participation | 10% |

The final course grade ranges will be:

| | |
|---|---|
| A | 93-100 |
| B | 85-92 |
| C | 77-84 |
| D | 69-76 |
| F | Below 68% |

**Course Guidelines:**

1. <u>Attendance and Participation</u>: Students are expected to attend class regularly and complete the assigned readings prior to class each week. The portion of the final course grade devoted to attendance (10%) will be divided into 14 equal segments. For each missed class, 1/14 of the percentage will be deducted. More than two class absences can result in deduction of a full (final) letter grade.

2. <u>Use of Technology</u> (laptops, cell phones, tablets): Please refrain from using your cell phone while in class. In the event of an emergency, feel free to step outside of class to take a call. Technology such as laptops and tablets are an integral part of this class, which includes extensive practice with statistical software. However, please be mindful to use technology as a learning tool and not a source of distraction.

3. <u>Late Assignments</u>: Homework assignments are due to Blackboard at the beginning of class on the day they are due. If you are unable to meet a due date, please contact me by e-mail (preferred) or phone <u>in advance of the due date</u> to discuss alternative arrangements. If you decide to hand in the assignment late, 10% will be deducted for each day it is late.

4. <u>Use of Blackboard</u>: Students are expected to utilize Blackboard to prepare for class and turn in assignments. All course materials, power points and grades will be posted on Blackboard.

5. <u>Group Work</u>: Homework assignments may be completed individually or as a group effort in groups of no more than three students. Groups should turn in one copy of the assignment and all members will receive the same grade. Students are responsible for organizing and managing groups, and groups do not have to maintain a consistent membership roster. In other words, your decision to complete an assignment individually or in a group can be changed back and forth over the course of the semester. You must submit a single document for all members of your group (do not submit a document for each individual group member) and the document must list the names of all group members. All those who worked together on a given assignment will receive the same grade. Management of group dynamics is the responsibility of the group's members.

**How to do well in this course**

1. Assignments

a. Allow at least 3-4 hours per assignment (sometimes more)

b. Come to class

c. Be thorough—respond to all parts of the questions

d. Ask questions in class and contact the instructor

2. Midterm and Final Exam

a. Review assignments and exam review guide

b. Review lectures/ Powerpoint slides

c. Synthesize and get the big picture!

**Schedule of Topics and Assignments (Tentative)**

**Link to dynamic calendar [HERE](HERE)**

| Date | Week | Topic covered | Assignments & readings |
|------|------|---------------|------------------------|
| **8/26** | **1** | Intro to course<br>Review: descriptive statistics<br>Review: distributions and sampling<br>SPSS setup | Background- Field, Chapter 1<br>(See also Chapter 4 for SPSS overview) |
| **9/2** | | **Labor Day Week  no class** | |
| **9/9** | **2** | Review: hypothesis testing, one sample *t*tests, confidence intervals | Background- Field Chapters 2, 3, and 5 |
| **9/16** | **3** | Correlation and<br>introduction to simple linear regression | Field Chapter 8<br><br>**HW #1 Due: One sample *t*tests and confidence intervals** |
| **9/23** | **4** | Simple linear regression continued | Field Chapter 9, pp. 293-320 |
| **9/30** | **5** | Intro to multiple linear regression | **HW #2 Due: Simple Regression**<br><br>Field Chapter 9, pp. 320-356 |

| 10/7 | 6 | More multiple linear regression | Field Chapter 9 (cont.) |
|---|---|---|---|
| 10/14 | 7 | Regression Wrap-Up: Model Building | Choose 1 Regression Article from BB |
| 10/21 | 8 | Midterm Exam | |
| 10/28 | 9 | Logistic Regression | |
| 11/4 | 10 | Two-Sample $t$-tests: Independent and Dependent | Field Chapter 10<br><br>**HW3 Due: Multiple Regression** |
| 11/11 | 11 | Introduction to One-Way ANOVA | Field Chapter 12 |
| 11/18 | 12 | More One-Way ANOVA/ Intro to Two-Way ANOVA | Field Chapter 14 |
| 12/2 | 13 | More Practice with Two-Way ANOVA (ONLINE) | Field Chapter 14<br><br>**HW #4 Due: two sample $t$-tests/ one-way ANOVA** |
| 12/9 | 14 | Categorical Data Analysis/ Chi-Square & Review of course/ Special topics | Field Chapter 19<br><br>HW #5 Due: Two-Way ANOVA/Chi-Square |
| 12/16 | 15 | Final Exam (In Class): 4 -6:50pm | |

**University Wide Guidelines and Expectations**

Students should visit http://go.vcu.edu/syllabus and review **all** syllabus statement information. The full university syllabus statement includes information on safety, registration, the VCU Honor Code, student conduct, withdrawal and more.