

## PSYCHOLOGY 340: ADVANCED STATISTICAL METHODS I

Department of Psychology  
University of Vermont



Fall 2008

3 Credit Hours

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Office Hrs: Wednesday 10-12, Fridays 1-3 (during lab). Additional meetings are available by appointment.

Erin is best reached by email and has a quick turn-around on email messages. Please call her only if absolutely necessary, this is her home phone number.

Lecture: M 12:20-3:20 (238 John Dewey Hall)

Lab: F 1:00-3:00 (128 John Dewey Hall)

Course related website: <http://www.uvm.edu/~dhowell/gradstat/index.html>

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### Course Description:

This is the first part of a two-series course required of all graduate students in the psychology program. The class will provide an overview of advanced statistics. We will cover data analysis with an emphasis on understanding data and quantitative thinking, graphical data displays, how distributions affect hypothesis testing, ANOVA, Repeated Measures, Multiple Regression, the General Linear Model, and a select number of additional topics. These statistical techniques are central to evaluating a variety of hypotheses in psychology and related fields.

### Course Objectives:

After completing this course, you will be familiar with the basic theory and analyses underlying each of the topics noted in the course schedule. More specifically, you will be proficient in:

- (1) Organizing and describing data, including useful plotting and graphical data display.
- (2) Selecting data analytic approaches that best test for specific research questions.

- (3) Understanding the theoretical assumptions underlying specific analyses.
- (4) Organizing data and importing it into statistical programs
- (5) Applying SPSS or SAS to perform the analyses covered in the course.

Meeting these objectives, however, does NOT mean that you will be an expert in all, or even any, of these statistical techniques. Expertise in statistics generally develops only after multiple, repeated applications to real-world problems (i.e., repeated analyses with data that you care about such as the problems and data you will encounter in your theses and dissertations). The intent of this course is to provide you with a basic overview and introduction to some statistical techniques. You will most likely develop your own area of statistical expertise and training through subsequent coursework and especially through research projects.

It is worth noting that statistics is the most difficult course taken for many psychology students. You will not completely understand most of what we cover. Most of you are accustomed to rapid and in-depth understanding of material you cover in courses. Statistics is different from content area learning. Statistics requires several stages of learning. You will relatively easily become proficient in procedural understanding (how to conduct particular analyses) and begin understanding statistics conceptually. Interpreting results is usually the most difficult for beginning graduate students. As such, we will spend a good bit of time on all of these aspects of data analysis. Additionally, understanding of how to think about research problems and apply analytic approaches to attempts at answering research questions will be incorporated throughout the course.

### **Course Materials (all books are available at the UVM bookstore):**

#### Required:

- Howell, D. C. (2007). Statistical methods for psychology (6<sup>th</sup> edition). Course material will be drawn primarily from this book.
- Norusis, M.J. (2007). SPSS 15.0 Guide to Data Analysis. Upper Saddle River, NJ: Prentice Hall.
- Additional handouts and readings will be passed out in class.
- A writable CD or flash drive is needed to save data sets and work throughout the semester.
- You will have access to lectures, assignments, labs, and review materials.

#### Optional:

- Gravetter, F.J. and Wallnau, L.B. (2008). Essentials of statistics for the behavioral sciences. 6<sup>th</sup> edition. Pacific Grove, CA: Wadsworth.
- SPSS, Inc. (2007). SPSS 15.0 Base User's Guide. Upper Saddle River, NJ: Prentice Hall.
- Norusis, M.J. (2007). SPSS 15.0 Statistical procedures companion. Upper Saddle River, NJ: Prentice Hall.

## Course Components:

### General:

- Attendance is required at all class meetings. The information presented and discussed is integrative and cumulative. Missing any aspect, therefore, leads to increased difficulty in understanding later material. ***Students are expected to have read assigned material before it is discussed in class***; class lecture and class discussion presume that students have read all assigned material.

### 1) Lab Assignments (Applied)

- There will be weekly lab assignments for most topics covered. They are designed to help you understand and integrate materials by working to solve problems using real data sets. These assignments will be available prior to the day when we cover them in lab, so that you may work on them beforehand. The intent of the labs is not for you to only “get the right answer,” but to develop statistical skills using SPSS or SAS in order to apply the ideas discussed in lecture.
- All lab assignments are due on the next lecture day (Mondays) following that lab. The assignments will be graded using a “pass/fail” system. A pass is equivalent to 1 point, a fail is no points. If you don’t turn in a homework assignment, or if you turn it in late and unexcused, you will receive no credit. The only exceptions to this policy are if you are ill or have an emergency and are unable to get the assignment in on time. You must notify the instructor in advance of illness. If you will be out of town at a conference or other professional activity, discuss it ahead of time with me and make arrangements to complete the missed assignment.

### 2) Exams (Theoretical and applied)

- Both theoretical and applied material will be covered on the exams, with an emphasis on the former.
- In general, the exams will involve analyzing data using SPSS (or SAS if you prefer), interpreting the output, and applying the results to theoretical principles covered in the course.
- The exams are in take home format.

### 3) Participation (Essential)

- All students are expected to participate in group discussions, ask questions to clarify material, and contribute to helping others in the class learn the material. If you do not ask questions, I will assume that you understand the material. It is your contributions to the class that will best help everyone meet their learning goals, so please adopt a helpful and team-oriented approach to the class as much as possible.

Course Evaluation:

Lab Assignments 20%

Exams 60% (2 equally weighted exams)

Participation 20%

Grading Scale:

100% A+	77-79% C+
95-99% A	74-76% C
90-94% A-	70-73% C-
87-89% B+	60-69% D
84-86% B	< 60% F
80-83% B-	

Academic Integrity:

Students must be present and on time for all exams. There will be no make-up exams except for University excused absences (e.g., medical emergencies, see the *Student Handbook* for more details). You must bring documentation to support such an excused absence. There are no make up labs. If you miss a lab you will miss very valuable information. Academic integrity is fundamental to the process of learning and evaluating academic performance. Academic dishonesty will not be tolerated. Academic dishonesty includes, but is not limited to, the following: cheating, plagiarism, tampering with academic records and examinations, falsifying identity, and being an accessory to acts of academic dishonesty. Refer to the UVM academic honesty policy for further information, including the consequences for acts of academic dishonesty. The policy is online at: <http://www.uvm.edu/~dosa/handbook/?Page=Academic.html>

Religious Holidays:

Please notify the instructor if you must miss class or an exam because of a religious holiday. I try to schedule exams around major religious holidays. If, however, I have failed to do so, notify me in advance and a make-up exam will be arranged. Similarly, if you must miss class to observe a religious holiday, notify the instructor in advance and arrangements can be made to get lecture notes.

Disability Accommodations:

Students requiring special assistance due to a disability are asked to contact the instructor during the first week of classes so that reasonable accommodation for the disability can be determined and arranged. Disability documentation, testing, and accommodations are coordinated through the ACCESS office on campus: <http://www.uvm.edu/~access/>.

### *Schedule of Topics, Assignments, and Readings*

Date	Topic	Reading/Assignment
9/1	Labor Day Holiday – No Class	
9/8	Introduction to statistics and data analysis	
9/12	Introduction to Statistical software and computing Lab 1	THC and activity Epinephrine and memory
9/15	Descriptive & Exploratory Data Analysis	Chapters 1 & 2 - Howell
9/19	Lab 2	Why Ozzie is Fried...
9/22	Sampling and Distributions	Chapters 3 & 4 – Howell
9/26	Lab 3	Hypothesis testing and HIV/AIDS
9/29	Probability: the illusions of null hypothesis testing; Frequentist and Bayesian Statistics	Chapter 5 – Howell Gigerenzer Paper
10/3	Lab 4	The 3 door problem Disclosure and perception
10/6	Power	Chapter 8 – Howell
10/10	Lab 5	Power – media violence and aggression
10/13	Correlation and Regression	Edwards Chapters 1 & 2 and Keith Chapter 1
10/17	Lab 6	Regression lab – occupation and Mortality, The SAT
10/20	Regression Mid-term Exam Handed out	Edwards (Chapters 1-3) and Keith (Chapter 1)
10/24	Optional lab	
10/27	ANOVA I Exam Due at beginning of Class	Chapter 11 - Howell
10/31	Lab 7	Reinforcement and learning

11/3	ANOVA II	Chapter 12 - Howell
11/7	Lab 8	Diazepam & Maze performance Presentation by topic learning
11/10	Interactions	Rosnow and Rosenthal (1995) Chapter 13 - Howell
11/14	Lab 9	Interactions – “Some things you learn aren’t so.”
11/17	Multiple comparisons and more on Factorial ANOVA	Chapter 12 - Howell
11/21	Lab 10	Noise and physiology – repeated measures Chapter 14-Howell (read <i>before</i> lab)
11/24	No Class - Thanksgiving Holiday	
11/28	No Lab - Thanksgiving Holiday	
12/1	Repeated measures	Chapters 6 & 14 - Howell
12/5	Lab 11	Mixed models – exercise and diet
12/8	More on repeated measures Regression for analyzing experimental data Handout final Exam	Chapters 6 & 14 - Howell
12/15 Due 5 p.m.	Final Exam	