

HRSP 371A, Research Design & Statistical Analysis, Fall, 2005 – Course syllabus

Location and times

Tuesday, Thursday 9:35 – 10:50 a.m.

Classroom #3/Rm. 8351, 8<sup>th</sup> floor, Medical Center East, South Tower

Instructor

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Office hours Thursday 1-3 or by appointment

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Course objectives

This class is designed for doctoral students, in fields such as communication disorders, education, and psychology, who are preparing for research-oriented careers. Students will acquire theoretical understanding and practical analysis skills for the basic research designs and statistical tests used in these fields. The Fall semester focuses on elements of hypothesis testing, categorical data analyses, simple regression and correlation, t-tests, and introductory analysis of variance. The Spring semester (HRSP 371B) focuses on analysis of variance and multiple regression. In all homework assignments and exams there is an emphasis on development of written expository skills as an integral part of research analysis.

Textbook and statistical software

Howell, D. C. (2002). *Statistical methods for psychology* (Fifth ed.). Pacific Grove, CA: Duxbury. For Spring semester we will use Maxwell, S.E. & Delaney, H.D. (2004), *Designing experiments and analyzing data*. Mahwah, New Jersey: Lawrence Erlbaum Associates. It would be useful to acquire the Maxwell & Delaney text by mid-November, so that it can be used as we study introductory analysis of variance. Homework and exam assignments will require the use of SPSS statistical software, which can be purchased or leased through the Information Technology Service at Vanderbilt University. Assignments will also require use of Excel spreadsheet software, or a similar spreadsheet/plotting program. Excel is bundled with most new computers these days. Some students may find the following helpful: Kirkpatrick & Feeney, *Simple guide to SPSS*. Excellent examples of research writing can be found in the publication manual of the American Psychological Association, which provides the publication format for many journals in psychology, education, and communication disorders.

Grading procedures

Final letter grades will be based on three take-home exams and nine homework assignments. Each homework assignment will be graded pass/fail, with one opportunity allowed per assignment to revise a fail to a pass. Collectively the homework will count 25% toward the course grade. Homework will be due on the second class session from when the assignment is given out. If more than one homework assignment is missing or failed, the student will receive no credit for any homework (effectively a 25% reduction in course grade). The three exams will count 25% each toward the course grade. Final letter grades will be based on 10% increments in total points: 90%+ = A range, 80-89% = B range, 70-79% = C range, 60-69% = D range, <60% = F. Within these ranges letter grade splits (e.g., B-, B, B+) will be made at the discretion of the instructor. For all homework and exams in this class, students are encouraged to discuss the problems with one another, although final written assignments should reflect each student's independent analyses and writing.

## Schedule of topics

Tuesdays	Thursdays
	<b>Aug 25</b> Types of study designs (Sec. 1.5); Introduction to Excel spreadsheet
<b>Aug 30</b> Descriptive statistics (Ch. 2), especially variance (pp. 47-51) and covariance (pp. 252-253)	<b>Sep 1</b> Normal and standard normal distributions (Ch. 3); HW1
<b>Sep 6</b> Introduction to hypothesis testing (Ch. 4, pp. 91-104)	<b>Sep 8</b> Hypothesis testing – errors, power (Ch. 4, Secs. 4.7-4.11);
<b>Sep 13</b> One-sample t-test (Ch. 7, Secs. 7.1- 7.3); HW2	<b>Sep 15</b> Matched sample t-test (Sec. 7.4)
<b>Sep 20</b> Independent samples t-test (Sec. 7.5); HW3	<b>Sep 22</b> Preview of analysis of variance (Ch. 11, mainly look at Sec. 11.4)
<b>Sep 27</b> Confidence intervals (Sec. 7.6), effect size (Secs. 8.1-8.2), and power (Secs. 8.3-8.7) Exam #1 handed out	<b>Sep 29</b> No class: Students will meet individually with instructor this week
<b>Oct 4</b> Introduction to regression (Sec. 9.5 -9.6) Exam #1 due	<b>Oct 6</b> Preview: Matrix approach to the equations for slope and intercept (Sec. 16.1); HW4
<b>Oct 11</b> Correlation defined in terms of covariance (Secs. 9.1-9.4)	<b>Oct 13</b> Hypothesis testing in regression and correlation (Sec. 9.10); HW5
<b>Oct 18</b> t-tests approached as a problem in regression	<b>Oct 20</b> Alternatives to the Pearson $r$ correlation coefficient (Ch. 10)
<b>Oct 25</b> No class – October break	<b>Oct 27</b> Categorical data: introduction to chi- square (Ch. 6, Secs. 6.1-6.3); HW6
<b>Nov 1</b> Two- and higher-way chi square tests (Secs. 6.4-6.5)	<b>Nov 3</b> Other measures of contingency (Secs. 6.9-6.10) Exam #2 handed out
<b>Nov 8</b> Introduction to analysis of variance (Ch. 11, Secs. 11.1-11.4; also, you can look at Ch. 3 in Maxwell & Delaney)	<b>Nov 10</b> Continue introduction to analysis of variance; Exam #2 due; HW7
<b>Nov 15</b> Model for analysis of variance (Sec. 11.6)	<b>Nov 17</b> Analysis of variance: Effect size and power (Secs. 11.11-11.12); HW8
Thanksgiving break	
<b>Nov 29</b> Multiple comparisons among means: Family-wise error rate (Secs. 12.1-12.2)	<b>Dec 1</b> Linear contrasts among multiple means (Sec. 12.3); HW9
<b>Dec 6</b> Post-hoc multiple comparisons (Secs. 12.4-12.10)	<b>Dec 8</b> Trend analysis (Sec. 12.13) Exam #3 handed out (due Dec. 15)

HW\_ designates dates when homework assignments will be handed out. The homework is due on the second class from when it is handed out.