

# Psychology 3400/5400: Advanced Research Design and Data Analysis, Spring 2009

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**Advanced research design and data analysis** takes a thorough look at the logic of research design, measurement, and inference in the context of behavioural research. Although we will deal extensively with statistics, we will do so from the perspective of the researcher rather than that of the statistician. Features and goals of the course include the use of a free-software, statistical computer package, known as the **R project for statistical computing** freely-available for virtually any operating system, and discussion of some current controversies. Topics covered will range from a thorough examination of the logic and principles of analysis-of-variance (ANOVA), through multiple regression (MR), Principal Components Analysis (PCA), to such esoterica as multi-way frequency analysis, randomization testing, signal detection theory, and information theory.

There are two books for the course, bundled together as a single volume. The first book is a reprinting of a useful, short paperback by Edwards on multivariate methods, unfortunately no longer in print, that his estate has given me permission to reprint for you at no cost. At times you will be asked to read certain pages and sections, but primarily it will be up to you to use the book as a supplement to lectures and handouts. The second is a set of readings I collected together for the course. These readings provide the basic material for the semi-weekly “position papers” and discussions in the course.

## Structure of the course

The course breaks roughly into two components. The first component is concerned with the basics of research design and analysis within the context of ANOVA and multiple regression, and is handled primarily with lectures and computer assignments. The second component, running concurrently with the first, is intended to be in more of a seminar format, and is based on the collection of readings on various issues.

Consequently, beyond the core material, the course is intended to be open-ended, ranging from brief flirtations

here to in-depth analyses there as determined only by our curiosity and interests. As such, the lectures will range from the coldly objective to the wildly polemical, inflammatory, and even outrageous as the professor (or the author of some article) takes a stand on some issue.

You are encouraged (indeed, required) in all instances to advance your own polemic in the interests of fair play and, more important, in an attempt to understand if not resolve some of the current controversies in the area. Informed and cogent opinion rather than agreement with the biases of the professor is one of the major goals of the course. To this end, you will be required to write “position papers” in which you are asked to argue for one side or another of a given controversy; which side you favor is up to your reading of the issue, but fence-sitting, compromising, waffling, or any other form of pseudo-intellectual “objectivity” is explicitly disallowed.

It is assumed that the student is familiar with basic, undergraduate statistics, APA format, and so on. If not, or you wish to “brush-up”, please consult my book *Thinking with Data*; the latest edition is always available free online at <http://people.uleth.ca/~vokey/pdf/thinking.pdf>, and also may be purchased at the university bookstore for the cost of printing.

## Evaluation

Almost every week of the course will have one or more assignments consisting of short “position papers”, or computer-based analyses, weighted according to their complexity or the amount of work required to complete them, for a total of 100% of your grade.

## Assignments

With the exception of those requiring the output of a statistical program, all assignments are to be word processed (computers are available for student use throughout the University). Hand-written (or typed, but not word-processed) assignments will not be accepted. All papers must conform to the format specified by the

Table 1

*Assignment-exam percentages will be converted to minimum letter-grades using this scale. Minimum letter-grade here refers to the lowest letter-grade that will be assigned on the basis of your objective performance; however, higher letter-grades may be assigned at the discretion of the instructor.*

Percentage	Grade	Percentage	Grade
90-100	A+	67-70	C+
85-90	A	63-67	C
80-85	A-	60-63	C-
77-80	B+	55-60	D+
73-77	B	50-55	D
70-73	B-	<50	F

American Psychological Association. Papers failing to do so in nontrivial ways will be assigned a failing grade, as will papers considered poorly-written for other reasons (e.g., significant errors of syntax, orthography, and structure).

With a few exceptions—such as tutorials on using R—lab assignments are to be done at your convenience, and turned in at designated times (usually, but not always, one week after the work is assigned). Some of these assignments will involve short essays, comment

and opinion, and others will consist of the analysis of various research designs using different computer packages.

### Class Times

Classes are scheduled from January 7, 2009 to April 17, 2009 for 1:40-2:55, Tuesday and Thursday in FA W514. Labs are scheduled for 3:05-4:20, Tuesday in FA W514.

### Course Web-page

The web-page for the course is at:  
<http://classes.uleth.ca/200901/psyc3400a/>.

### Consultation Outside of Class-time

No formal office hours are scheduled. Rather, I may be contacted in my office, UH D862, or my lab, UH C810, or by phone at 329-2409. Please feel free to drop in with any questions, comments, or opinions you may have. I would prefer that you use e-mail to communicate both with me ([vokey@uleth.ca](mailto:vokey@uleth.ca)) and your fellow classmates ([psyc3400a@uleth.ca](mailto:psyc3400a@uleth.ca) and [psyc5400a@uleth.ca](mailto:psyc5400a@uleth.ca)). The TA for the course is John Granzow; he may be contacted at [granje@uleth.ca](mailto:granje@uleth.ca).