

Psychology 3400/5400/7400:  
Advanced Research Design and Data Analysis,  
Spring 2015



John R. Vokey  
Department of Psychology  
University of Lethbridge

December 16, 2014

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 popular statistical computer package, known as the  **project for statistical computing** freely-available for virtually any modern 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) to multi-way frequency analysis and randomization testing, to such esoterica as Principal Components Analysis (PCA), signal detection theory, and information theory.

There are two books for the course. The first is a useful, short paperback by Edwards on multivariate methods, unfortunately no longer in print, that his estate has given me permission to provide 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 the assigned readings for the course. These assigned readings provide the basic material for the semi-weekly “position papers” and discussions in the course. The second book is Steven Pinker’s latest, entitled *A sense of style*—a book about good writing that is itself an exemplar of the Classic Style. Again, you are to read the book as a supplement to the lectures and advice on writing distributed throughout 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, multiple regression, and multi-way frequency analyses, 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 argument rather than agreement with the biases of the professor and/or author 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 favour 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 co-authored with Dr. Allen *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 cost from the university bookstore.

## Evaluation

Almost every week of the course will have one or more assignments consisting of short “position papers”, or computer-based analyses, weighted equally.

## 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 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). A large component of the course, and the reason for the weekly papers, is that, through almost weekly feedback, we can learn to produce the clear, concise, expository prose expected by scientific journals.

With a few exceptions—such as tutorials on using —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 packages in . The essay assignments will be based on a focal reading for that week, often accompanied by supplementary readings. These readings (or links to them, or instructions on how to obtain them) will be available on the Moodle web-site (<http://moodle.uleth.ca>) for the course.

The work you submit *must be your own*. It is an academic offence to submit someone else's work as your own. Please see section 4 of Academic Offences, Student Discipline Policy—academic offences (p. 78 of the 2015 academic year calendar) for details.

## Class Times

Classes are scheduled from January 8, 2014 to April 16, 2015 for 1:40-2:55, Tuesday and Thursday in UH C674. Labs are scheduled for 3:05-4:20, Tuesday in AH 177.

## 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. Please feel free to drop in with any questions, comments, or opinions you may have. I would prefer that in the first instance you use e-mail to communicate with me ([vokey@uleth.ca](mailto:vokey@uleth.ca)) and your fellow classmates ([psyc3400a@uleth.ca](mailto:psyc3400a@uleth.ca), [psyc5400a@uleth.ca](mailto:psyc5400a@uleth.ca)

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

and [psyc7400a@uleth.ca](mailto:psyc7400a@uleth.ca)). The TA for the course is Ms. Carrie Leonard; she may be contacted at [carrie.leonard@uleth.ca](mailto:carrie.leonard@uleth.ca).

## On Learning

 is a powerful statistical package and programming system. Mastering it takes time and practise—a lot of practise. The associated application, *R Studio* <http://www.rstudio.com>, makes that task much easier, and we will do all of our explorations about  with that application. The weekly tutorials are provided to get you started, but you really must engage with  on an almost daily basis to obtain that mastery and, hence, the power it provides. That means you will have to explore it on your own time (as I have done), using the internet, the  web-site, the many supplementary resources available there, and not just use it to do the minimum required by the weekly tutorials. To that end, it is required that each student has ready access to a computer on which the latest version of  and R Studio (and other associated packages) can be installed, and accessed frequently.