Applied Statistics
Family Relations and Applied Nutrition
FRAN 6010
Fall 2014

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Office Hours: Wed. 1:30 - 3:00
other days by appt.

Class: Tues. 11:30 - 12:50 in MACS 331
Tues. 1:00 - 2:20 in MACS 243

Web Site: There is also a Courselink site for the course.

Course Description

This course is designed to provide graduate students with a conceptual understanding of the issues and methods related to descriptive and univariate statistical analyses, regression modeling, logistic regression, multivariate analysis of variance/covariance, and repeated measures analysis of variance/covariance models (including univariate and multivariate applications) appropriate in applied social/health science research. The course covers conceptual and practical applications of statistical analyses with emphasis on selection of appropriate methods and models to address both simple and complex, multi-factorial data. This course is data-driven and students will learn primarily through hands-on analytic experiences accompanied by in-class lectures and readings.

Required Readings

Field, A. (2013). *Discovering statistics using SPSS (4th ed.)*. London: Sage.

The book is available at the bookstore. Readings (e.g., published articles or textbook chapters) and SPSS guides (i.e., chapters from SPSS manuals) will be distributed or made available for duplication.

Required Software

SPSS for Windows will be used for this course. This program is available in the undergraduate data labs in both HAFA and MacKinnon buildings. For those wishing to obtain a copy of SPSS the **free concurrent version** is available from:

http://www.uoguelph.ca/ccs/software/software-distribution

Recommended Supplemental Materials

American Psychological Association (2009). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: Author.

Tabachnick, B. G. & Fidell, L. S. (2012). *Using multivariate statistics* (6th ed.). New York: Pearson.

A good introductory statistics text to review basic concepts is also helpful.

Course Objectives

Many recent advances in computers, software, and statistics provide new "tools" for scientists to employ. Of course, those who fear statistics like the plague may wish they completed their graduate training 50 years ago when a basic understanding of regression and analysis of variance (ANOVA) was all that was required to survive! Regression and ANOVA still form the primary basis of most analytic methods and we will explore many extensions and variations of these techniques. The unique combination of backgrounds and the various foci of research among class participants make a course like this very interesting. The basic tools remain the same and share a common language across disciplines, and the new methods you will gain will be applicable to your specific interests.

In this course you will have the opportunity to:

- Advance your knowledge about testable hypotheses and understanding how they relate to complex datasets
- Expand your abilities to work with SPSS to include univariate and multivariate analytic procedures

And, not surprisingly, we will emphasize:

- Interpretation of computer output, focusing on critical components necessary for properly reporting results, and understand what story the data "tell"
- Practice writing skills necessary for technical reports, methods and results sections
- Preparation for thesis work, publication efforts, and future professional activities by adding advanced methods to the methodological "tool box" we started in the earlier module

Course Structure

Class time will be divided into two parts: (1) introduction of new material in lecture (MACS 331), and, (2) demonstrations and interpretations of statistical techniques using empirical examples (MACS 243).

Course Requirements

The purpose of this course it to provide you with the ability to form hypotheses, select appropriate statistical tests, conduct statistical analyses, interpret your results, and use this information in a manner to help you to be productive in both your graduate training and your chosen profession. It is not the purpose of this course to overload you with symbols and

equations. Ultimately, becoming an informed user of statistics and statistical software is the goal of this course. Your efforts will be evaluated accordingly.

Evaluation

Data Applications

Problem sets will be assigned that apply to topics considered in class. There will be **three** assignments contributing a total of 70% to your final grade. You are expected have your SPSS output available (in case your results do not match) and a write-up that includes a modified version of an APA methods, results, and brief discussion section, demonstrating your understanding. Examples of why this is called a "modified" APA format include reporting assessment of normality and data screening procedures, as well as including reports for assorted diagnostics (e.g., Levene's, appropriate post-hoc analyses, regression diagnostics, etc). The best method for learning a statistical software package, a new analysis, or to understand output is to actually do it yourself. Whereas I encourage you to ask your colleagues questions, you are strongly urged to do your own work rather than relying on someone else for answers. Your ability to complete the assignments will correspond directly to your ability to complete the final take-home examination.

Take-Home Final

There will be **one** take-home **final assignment/examination** contributing 30% to your final grade. You are expected to work alone to complete this exam.

> *Keep the following issue in mind*:
> ***More ≠ better!*** The take-home exam format does not mean you have to write hundreds of pages. You are expected to answer the questions and discuss and interpret the results. Concise scientific writing is actually more difficult to accomplish than lengthy diatribes. Strive to be concise!

I will try to maximize the amount of time you have to complete the exam while I ensure that I have time to complete assessment and submit grades on time!

E-mail Communication

As per university regulations, all students are required to check their **uoguelph.ca** e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the instructor in writing, with your name, id#, and e-mail contact. See the graduate calendar for information on regulations and procedures for Academic Consideration:
http://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e1400.shtml

Drop Date

The last date to drop one-semester courses, without academic penalty, is **October 31**. Refer to the Graduate Calendar for the schedule of dates:

http://www.uoguelph.ca/registrar/calendars/graduate/current/sched/sched-dates-f10.shtml

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. The Academic Misconduct Policy is detailed in the Graduate Calendar:
http://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e1687.shtml

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded in any electronic media without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

Assignments are due by 5 p.m. on due dates. Late papers will be accepted with a penalty of 5% deduction per day.

Class Schedule and Reading Assignments

Date	Topic	Readings and Comments
September 9	**Overview of stats/SPSS, hypothesis testing, basic group comparisons**	Field 1-5, 9 Optional: T&F 1-4, *Assignment #1 handed out*
September 16	**Hypothesis testing & basic comparisons, con't** **Begin one way analysis of variance (ANOVA)**	Field 1-5, 9-11 Optional T&F 3, Aguinis & Harden (2009), Cortina & Landis (2009).
September 23	**ANOVA including two way designs & intro to covariates (ANCOVA)**	Field 11-13, 15 Optional: Field 6 T&F 3,6 *Assignment #1 turned in* *Assignment #2 handed out*

September 30	**Regression concepts and practice (Simple Linear Regression, Correlation & Partial Correlation)**	Field 7,8 Optional: T&F 5, also Norusis 21-23 is worth copying
October 7	**Multiple regression (simultaneous, stepwise, and hierarchical models), model building, and diagnostics**	Field 7,8 Optional: T&F 5, also Norusis 21-23 is worth copying *Assignment #2 turned in*
October 21 **NO CLASS OCTOBER 14 RESCHED. TO NOV. 27**	**Introduction to multivariate topics** **Matrix Algebra basics** **Begin Multivariate Analysis of Variance (MANOVA)**	Field 16; A skimpy intro to matrix algebra (Tabachnick & Fidell, 2007) Multivariate analysis of variance and covariance (Huberty & Petoskey, 2000) GLM Multivariate Analysis (SPSS Manual) Optional: T&F 7, 8, 17
October 28	**MANCOVA, Repeated Measures Analysis of Variance (univariate and multivariate, plus covariates)**	Field 12, 14, 16 Stevens (1996); browse Hertzog & Nesselroade (2003) for the gist of analysis of change GLM Repeated Measures (SPSS Manual) Optional: T&F 7, 8, 17 *Assignment #3 handed out*

November 4	**Introduction to Path Analysis**	Baron & Kenny, 1986 (required)
November 11	**Path Analysis: Mediators and Moderators**	Field 10 Baron & Kenny, 1986 (required) Others if interested in examples: Keller et al., x2; Navara & James, 2002; Paquet, et al., 2003; Wahlin, et al., 2003); Edwards (2009); LeBreton et al. (2009). Klem (1995) for path analysis *Turn in Assignment #3*
November 18	**Logistic Regression**	Field 18, 19 Afifi & Clark (1996) Optional: T&F 10, Logistic Regression (George & Mallery, 2001; Norusis, 2005)
November 25	**More on Logistic Regression and Discriminant Function Analysis (DFA or DA)**	Same as above **Take-home exam due date TBA**
November 27 **This is the makeup day for October 14**	**Final Class -Wrap up of all concepts** **Course evals**	Move to previous class?

Note. T&F=Tabachnick & Fidell.

References

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Aguinis, H., & Harden, E. E. (2009). Sample size rules of thumb: Evaluating three common practices. In C. E. Lance & R. J. Vandenberg (Eds). *Statistical and methodological myths and urban legends* (pp. 269-286). New York: Routledge

Baron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 5,* 1173-1182.

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Cortina, J. M., & Landis, R. S. (2009). When small effect sizes tell a big story, and when large effect sizes don't . In C. E. Lance & R. J. Vandenberg (Eds). *Statistical and methodological myths and urban legends* (pp. 287-308). New York: Routledge.

Edwards, J. R. (2009). Seven deadly myths of testing moderation in organizational research. In C. E. Lance & R. J. Vandenberg (Eds). *Statistical and methodological myths and urban legends* (pp. 143-164). New York: Routledge.

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