

Advanced Statistics for Behavioural Research (PSYC-4111), Fall 2016

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Lectures: Monday and Wednesday, 4:00PM-5:30PM (AT-1010)
Computer Lab: Tuesday, 1:30PM-2:30PM (AT-3001)

Pre-requisites: The pre-requisite for this course is Psychology 2101 (or equivalent).

Course Website. There is a Desire2Learn (D2L) site for this course—more info to follow.

Discussion Forum. D2L includes a discussion forum tool, but in my opinion, it does not work very well. Therefore, the [class discussion forum](#) will be set up in Google Groups. It will be a private group, meaning that only members of this year's class (students, graduate teaching assistants, and the instructor) will be able to see it. Please post your questions and comments there rather than e-mailing them to me or a GTA. If you are struggling with something we've talked about, it is likely that others are too. If there is an open discussion about the problem in the Google Group forum, everyone can benefit.

I want to stress two things about posting questions to the discussion forum:

1. The only stupid questions are the ones you should ask, but don't.
2. If you have an answer to something posted by one of your classmates, please post it. Do not wait for me or the teaching assistants to answer all the questions. Even if your response is not totally correct, it will probably be useful. Past experience suggests that student responses on discussion boards often create teaching opportunities that would not otherwise arise.

Lecture notes. Lecture notes and PowerPoint slides will be available through the Course Content section of the D2L site. A list of good online resources is also provided (see below).

The lecture notes may contain more detailed information and examples than the PowerPoint slides. If you read only the PowerPoint slides and neglect the notes, you will miss out on things that could appear on the midterm test or final exam.

Online resources. Here is a list of online textbooks and notes you may find helpful.

- <http://onlinestatbook.com/>
- <http://davidmlane.com/hyperstat/index.html>

- <http://www.psychstat.missouristate.edu/sbk00.htm>
- http://www.une.edu.au/WebStat/unit_materials/index.htm
- <http://www.biostathandbook.com/>
- <http://www.spss-tutorials.com/>
- <http://www.ats.ucla.edu/stat/spss/>
- <http://www.spsstools.net/>
- <http://sites.google.com/a/lakeheadu.ca/bweaver/Home/statistics>
- <https://sites.google.com/a/lakeheadu.ca/bweaver/Home/statistics/introductory-biostatistics>
- <http://sites.google.com/a/lakeheadu.ca/bweaver/Home/statistics/spss>

Textbooks. There is no required textbook for this course, because all of the information you need can be found in the class notes and recommended websites. However, past experience suggests that some of you may wish to buy one or more books. Bear in mind too that *a good general statistics text is a great resource in graduate school and beyond*. With that in mind, a list of books you might consider is provided in an Appendix to this document.

Software. The statistical package that we will use in this course is called **SPSS**. Those of you who took PSYC-2101 are already somewhat familiar with it, I expect. Those who are not familiar may have to work a bit harder initially to catch up. SPSS is installed in all three of the computer labs on the 3rd floor of ATAC. A one-year license can also be purchased via the Helpdesk (ATAC, 2nd Floor) for a reasonable price. (I believe the cost was \$120 last year.)

Goals. The goals of the course are:

- To help you learn some more things about statistics, and some more things about SPSS.
- To help you become more *resourceful*.

The separation of statistics and SPSS in the first goal may seem strange, given that SPSS is a statistical software package. I separated them for two reasons:

1. The ability to navigate through the SPSS menus and make it produce some output is not the same thing as knowledge of statistics. The former can easily be done without the latter, but this is ill-advised.
2. Some of the things you will learn about SPSS are not really statistical. They have more to do with data management (e.g., recoding a variable, or restructuring a data file to make it suitable for a particular form of analysis).

Data management skills are very important for data analysts: Most full-time data analysts spend far more of their time on data management than on actual data analysis. But these skills are also very transferable. So I hope that many of you will benefit in the future from this important part of the course.

Look at the first goal again, and notice that the wording is *to help you learn*, not *to teach you*. That wording was intentional. It is up to *you* to learn the material. The graduate teaching assistants and I are resources that are available to you. We will do our utmost to help anyone who demonstrates that they want to learn; but we will have very little time or patience for anyone who demonstrates that they have no real interest in learning.

The second goal of the course is to help you become more *resourceful*. One way we hope to do that is by not having a required textbook for this course. When you get out there in the real world, and are faced with some thorny statistical problem, you won't always have the luxury of finding the solutions to all of your problems in "the textbook". In a lot of cases, you will have to use a variety of resources to find the information you need.

Statistical Topics. The following statistical topics will be covered, more or less in the order shown. Actual dates are not given, because they will depend on the rate at which we progress through the topics.

- Review of major topics from Psych 2101
 - Hypothesis testing
 - Z- and *t*-tests
 - Simple linear regression
 - One-way ANOVA
- Multiple Comparison Procedures
- Factorial (between-subjects) ANOVA
 - fixed and random factors; balanced & unbalanced designs
- Repeated Measures & Mixed design (between-within) ANOVA
- Multiple Regression
- General Linear Model (GLM) and ANCOVA
- Introduction to Multilevel Regression
- Additional Topics (time permitting):
 - Introduction to Logistic Regression
 - Introduction to Methods for dealing with Missing Data

SPSS Topics. The following SPSS topics will be addressed, more or less in the order shown.

- Using the PASTE button to generate syntax (instead of clicking OKAY)
- Data transformations (COMPUTE, RECODE, etc.)
- Data management (merging files, aggregating, restructuring)
- Performing the analyses listed under Statistical Topics, and understanding the output

Assessment:

Description	Worth	Tentative Date ¹
Assignment 1	5%	28-Oct-2016
Assignment 2	10%	18-Nov-2016
Assignment 3	10%	02-Dec-2016
Midterm Test	25%	24-Oct-2016
Final Exam	50%	TBA

¹ The date of the Final Exam will be determined by the Registrar's Office. The other dates may need to be adjusted, depending on how quickly we progress through the course material.

More information about assignments will be provided in D2L. Assignments must be submitted when due. Any excuse for missing an assignment due date should be discussed in advance with the instructor. Unless there are extenuating circumstances (i.e., medical or compassionate reasons), **late submissions will be penalized 10% (of a perfect score) per calendar day late**. E.g., for an assignment that is scored out of 100, if your grade is 75, but are two days late, your penalized score will be $75 - 20 = 55$. If your grade is 100, but you are 5 days late, your penalized score will be $100 - 50 = 50$.

The midterm test assesses material up to the end of multiple comparison procedures. The Final Exam will be scheduled by the Registrar's Office, and assesses material from the entire course.

You may bring **two pages** of crib notes (i.e., a *cheat sheet*) for the midterm test, and **four pages** of notes for the final exam. *Two pages* means **one sheet** of double-sided 8.5 x 11 inch paper. *Four pages* means **two sheets** of double-sided 8.5 x 11 inch paper. There are no restrictions on font size.

Please note that the real benefit of such notes is in the preparation. You can bring a copy of someone else's notes if you wish (and they allow it), but they will not help you nearly as much as notes you have prepared yourself.

Please also note that I do **not** give extra assignments or additional work of any kind for students who wish to raise their grades. If I do that for one student, I have to do it for everyone, and then final grades are not final at all—and **that** is a *Pandora's box* I have no desire to open.

Finally, the instructor reserves the right to adjust final marks up or down based on the performance of the class as a whole.²

Academic dishonesty. Please familiarize yourself with the Lakehead University Academic Dishonesty Policy.³ Any student who is suspected of academic dishonesty will be treated according to the published policy. ***With respect to the SPSS assignments, you are encouraged to help each other learn the material. However, those parts of an assignment that ask you to explain the results must be done individually.***

Accommodations. Lakehead University is committed to achieving full accessibility for persons with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. If you think you may need accommodations, you are strongly encouraged to contact Student Accessibility Services (SAS) and register as early as possible. For more information, please visit <http://studentaccessibility.lakeheadu.ca>.

² But judging by past experience, no adjustment will be needed.

³ See item IX of the [University Regulations](#).

Appendix: Annotated list of Textbooks

Book	Comments
<i>Statistical Methods for Psychology</i> , by David Howell	This is the one I recommend. It is a classic that has been around for many years. The most recent edition (the 8 th) was published in 2012, and sells for about \$350 on amazon.ca— but a used copy of an earlier edition would be more than adequate.
<i>Discovering Statistics Using SPSS</i> , by Andy Field	<p>When the first edition of this book appeared in 2000, I was very optimistic about its potential as a text for courses like 4111. One nice feature was that it included a lot more information than most other textbooks about how to perform various analyses with SPSS—although Field discouraged the use of syntax.⁴ However, when I started reading it, I was <i>appalled</i> at some of the truly <i>awful</i> advice that was given to readers.⁵ For that reason, I decided that I could <i>never</i> recommend the first edition to students. To be fair, the most egregious problems in the first edition have been remedied in later editions. But it’s still a bit too <i>cook-bookish</i> for me, and not as trustworthy as the book by David Howell.</p> <p>Having said that, many students <i>love</i> this book. Field’s style is engaging and irreverent—or <i>cheeky</i>, as the Brits say. E.g., the 3rd edition (2009) adds “(and sex and drugs and rock ‘n’ roll)” as a subtitle. The paperback version of the 4th edition currently sells for about \$100 on amazon.ca.</p>
<i>IBM SPSS Statistics 19 Made Simple</i> , by Paul R. Kinnear & Colin D. Gray	I am not very familiar with this book, but can report that some students in the past have found it helpful in showing them how to perform various analyses with SPSS. It sells for about \$70 at amazon.ca.
<i>SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS [Paperback]</i> , by Julie Pallant.	I am not familiar with this book, but have heard good things about it from some people. Many of the items listed in the table of contents are relevant to 4111. Amazon.ca sells a spiral bound version for about \$50. ⁶
<i>IBM SPSS for Intermediate Statistics</i> , by Nancy L. Leech, Karen C. Barrett & George A. Morgan	I am not personally familiar with this book, but I have a copy the publisher sent me. A former GA for this course borrowed it, and reported that it was quite helpful. YMMV. ⁷

4 As you will discover, I believe that students should be taught from day 1 to use SPSS syntax. A list of compelling reasons for using syntax is provided on Raynald Levesque’s excellent SPSS Tools Website:

<http://www.spsstools.net/LearningSyntax.htm#KeyItems>.

5 For example, readers were advised to carry out a test of normality as a precursor to an independent groups *t*-test, and to proceed with the *t*-test only if the test of normality was non-significant. As you will discover when we review *z*- and *t*-tests, tests of normality as precursors to *t*-tests or ANOVAs are almost completely useless.

6 But the second edition can be downloaded [here](#) for free.

7 Your mileage may vary. ;-)