82:350 – ADVANCED STATISTICS AND RESEARCH METHODS IN PSYCHOLOGY

Fall Semester:	September 7th – December 7th 2022		
Lectures:	Mon and Wed:	3:40pm – 5:00pm	BB 1-53
Labs:	Thurs:	4:30pm – 7:30pm	EOL Lab

Instructor:	Nicholas Watier, PhD
E-mail:	WatierN@BrandonU.ca
Office hours:	I am available by appointment

Course Information: Moodle for all course announcements, grades, assignment information, lecture slides, and lab manuals (moodle.brandonu.ca;)

Course Description (from the course calendar): This course will provide an introduction to advanced topics in the statistical analysis of correlational and experimental research in psychology. Topics will include research design, factorial and repeated analysis of variance, multiple regression, and nonparametric tests. Labs will require students to acquire skills in the use of statistical analysis software, and to conduct, analyze and report a small group research project. This course is required of Bachelor of Arts and Bachelor of Science students before entering the Honours program in Psychology, and is normally taken in the third year of their program.

Course Description (from the perspective of the instructor): Now the fun begins. This course aims to prepare students for completing an honors thesis. The first third of the course will focus on key concepts in experimental designs, statistical inference, null hypothesis testing, and techniques surrounding analyzing data from experimental designs, with an emphasis on analysis of variance. While there will be overlap from the content of 82:250 and 82:251, the material will be presented in greater detail and in more depth, so as to develop mastery in statistics and research design. The second third of the course will focus on writing a research proposal. Lectures will focus on developing a research question, searching for journal articles, designing an experiment from the ground-up, creating an outline, and effective writing strategies. The final third of the course explores correlational designs and associated analyses. Techniques in correlation and regression models will be presented. Throughout the course, an appreciation for mathematical formalism and conceptual understanding will be fostered during the lectures and in the laboratory. **You are encouraged to ask questions and speculate wildly**. Use this class as an opportunity to challenge yourself intellectually in a supportive and collaborative environment.

Prerequisite: 82:251

Delivery: Lectures will be conducted in Brodie 1-53, and the labs in the EOL lab, which is located in the basement of McMaster Hall. The labs will involve learning how to use SPSS, which is a popular statistical software package.

Computer Software: You will have access to the university license for SPSS on your home computer. IT services has instructions for installing SPSS on Microsoft Teams.

The university only allows 25 users to access SPSS concurrently. Consequently, while it is unlikely, you may occasionally be unable to access SPSS. As a result, I would recommend that you rent a personal license for SPSS if you can afford it. The following websites allow students to rent SPSS for

6 or 12 month periods: https://studentdiscounts.com/standard.aspx and https://estore.onthehub.com/. The cost is approximately $70 for a 6-month rental. Each site has various options to rent SPSS. You will need the **Standard - GradPack** option for this course. You can rent earlier versions of SPSS if your computer does not meet the system requirements for the most recent version.

You will also be required to download and install G*Power, which is freely available and can downloaded here: https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower.html

Optional Textbook: A textbook is not required for this course. Students can achieve an A+ grade by regularly attending class and the labs, taking notes, consulting the lecture slides and lab manuals, and asking questions when the need for clarification arises. That said, some students appreciate having an additional resource available.

If you are going to purchase a textbook, I recommend: Field, A. P. (2017). *Discovering Statistics Using IBM SPSS Statistics (5th Edition)*. London: Sage. This is a playfully written statistics textbook and guide to using SPSS. The content includes analyses that are typically taught at the graduate level, and there are practice-exercises, data sets, and solutions to end-of-chapter questions posted on the book's website (https://edge.sagepub.com/field5e). This text is an especially useful resource for your honors thesis and graduate school. The course outline below lists each lecture and lab topic with its corresponding chapter in the Field (2017) textbook.

Some of the chapters are technical. You will probably have to read the same passage a few times in order to internalize the information. Don't be discouraged if you don't understand the content right away. Like any skill, statistics requires practice and patience.

Lab Manual: I have written a lab manual for this course. The lab manual is comprised of step-by-steps instructions for conducting statistical analyses in SPSS. Each lab has a corresponding entry in the lab manual, and all of the entries are posted on Moodle. You can rely on these entries when completing the data analysis assignments in lieu of the textbook.

Course Outline (approximate temporal sequences of Lectures and Labs)

Topic #	Lecture Title	Chapter
1	Experimental Designs	Chapter 1
2	Statistical Inference	Chapters 2 & 3
3	Null Hypothesis Testing	Chapters 2 & 3
4	Power and Effect Size	Chapters 2 & 3
5	Single Factor Analyses of Variance	Chapter 12
6	Factorial Designs and Analyses of Variance	Chapter 14
7	Research Proposal: Research Question and Literature Review	None
8	Research Proposal: Designing an Experiment	None
9	Research Proposal: Components and Creating an Outline	None
10	Research Proposal: Writing Strategies	None
11	Correlation	Chapter 8
12	Multiple Regression	Chapter 9

Lab #	Lab Title	Chapter
1	Review of Descriptive Statistics	Chapter 1

2	Introduction to SPSS	Chapter 4
3	Data Cleaning and Screening	Chapters 5 & 6
4	T-Tests and Non-Parametric Equivalents	Chapters 7 and 10
5	G*Power	Prajapati et al., 2010
6	ANOVA & Multiple Comparisons	Chapter 12
7	Repeated Measures ANOVA	Chapter 15
8	Factorial Fully BS ANOVA	Chapter 14
9	Factorial Fully WS and Mixed ANOVA	Chapters 15 and 16
10	Correlation	Chapter 8
11	Multiple Regression	Chapter 9

Evaluation: Five take-home data analysis assignments, and a research proposal, including an outline. Each data analysis assignment is worth 9% (for a total of 45%), and the research proposal is worth 50%. The outline for the research proposal is worth 5%.

Evaluation Item	Course Material that the Item will Cover	Approximate Due Date	Proportion of Final Grade
Data Analysis #1 – Cleaning & Screening	Labs: 1,2,3 Lecture Topic: None	Sep 29th	9%
Data Analysis #2 – T-Tests and Power	Labs: 4,5 Lecture Topics: 2,3,4	Oct 13th	9%
Data Analysis #3 – ANOVAs	Labs: 6,7 Lecture Topic: 5	Oct 27th	9%
Data Analysis #4 – Factorial ANOVAs	Labs: 8,9 Lecture Topic: 6	Nov 17th	9%
Data Analysis #5 – Correlation & Regression	Labs: 10,11 Lecture Topics: 11,12	Dec 2nd	9%
Research Proposal – Outline	Lecture Topic: 9	Nov 14th	5%
Research Proposal – Final Draft	Potentially Everything	Dec 12th	50%

Data Analysis Assignments: The data-analysis assignments are take-home exercises in SPSS that involve analyzing a data set. The format of the assignments will be similar to the practice exercises included at the end of each weekly entry in the lab manual. You may ask questions and use any resource at your disposal while working on the assignments (e.g. Textbook, Notes, Google). I will email each assignment to students two weeks before the due date. Students are expected to type out their responses in Word and submit them as an attachment in an email.

Research Proposal: The overall aim of the assignment is to mimic the initial stages of a comprehensive research project (e.g. an honour's thesis). The entire class will work on the same project, but each student will submit their own written research proposal. **The research topic is Fear**. The exact research question will be determined as a class after Thanksgiving. While working in conjunction with the professor and your peers, you will be tasked with searching for relevant peer-reviewed literature, evaluating and summarizing the relevant findings, identifying a gap in our understanding of the phenomenon/topic, developing a rationale for conducting a study to address that

gap, proposing hypotheses that are relevant to the study, designing an **experiment** to test the hypotheses, and anticipating data analysis strategies. While this might sound dauting, we will be working on your proposal together, progressing through each of the steps as a class as a whole.

There are five assigned readings for the research proposal, which are posted on Moodle. The readings are book chapters and journal articles that provide a general overview of the pertinent literature on Fear. You are expected to complete one reading per week for the first five weeks of the course. These should give you sufficient background knowledge on Fear to start thinking about potential research questions.

Prior to the Fall Break, we will work together on creating an outline for your proposal. Once classes resume after the Fall Break, your outline for the research proposal is due. It will be evaluated on a pass/fail basis.

Sample papers, assigned readings, and a detailed description of the research proposal, which includes a timeline, a sample outline, and writing instructions, are posted on Moodle.

Extensions: If you are unable to submit an evaluation item, please notify me prior to the due date. In general, if you require an extension, I will grant one. Unless otherwise requested, I do not need supporting documentation. I understand that moments occasionally arise where it seems that factors beyond worldly comprehension have manifested and conspired to solely undermine your ability to perform and focus on your studies (e.g. death, illness, divorce or separation, family responsibilities). These moments, while distressing, should not ultimately impede your progress, as long as you have been taking your studies seriously up to that point. As such, an extension is reasonable accommodation to grant. That being said, if I obtain the impression that students are taking advantage of me or are simply trying to avoid responsibility, no extension will be granted, and you will receive a late penalty whose magnitude is determined by individual circumstances, including a grade of zero.

How to Succeed: My expectations are that you will attend class, pay attention, take notes, ask questions, and give yourself plenty of time to complete the data analysis assignments and the steps of the research proposal. Essentially, my expectations are that you will take your responsibilities as a student seriously. I want you to succeed. I want you to obtain an 'A' grade. I want you to actually learn something and enjoy your time in this course. I have structured the course and the evaluation items so that students who make the effort to follow these expectations will be rewarded. Success in the course requires a fair degree of trust in one-another: you need to trust me that my approach to teaching the material is effective, and I need to trust that you are going to give an honest attempt at working through the material.

Statement on Academic Integrity (from the Instructor): All of the assignments for this course are take-home and open-book. The reason being is that I want you to spend time **THINKING** about statistics, and not memorizing the material so you can regurgitate it on in-class test. You will rarely ever be in a position where you only have 90 minutes to analyze a data set and answer questions about statistics without access to any resources. Consequently, I opted to give you the opportunity to work at your own pace, think about the questions carefully, and provide an answer that reflects your understanding rather than a verbatim output of a textbook.

Unfortunately, this method of evaluation leaves open the possibility of plagiarism, misrepresentation, and other methods of academic dishonesty. As stated in the Senate Policy on Academic Integrity (https://www.brandonu.ca/senate-office/senate-policies/) , students that are suspected of departing from academic integrity will have a hold placed on their course withdrawal eligibility, meet with the professor to determine student's responsibility for departure, and if the student was deemed responsible, face sanctions from the Dean, including: a grade of zero on the assignment, a grade of F-AD in the course, or expulsion from the university.

Accessibility Services: Brandon University values diversity and inclusion, recognizing disability as an aspect of diversity. Our shared goal is to create learning environments that are accessible, equitable, and inclusive for all students. The Student Accessibility Services (SAS) office works with students who have permanent, chronic, or temporary disabilities. SAS will provide and/or arrange reasonable accommodations. If you have, or think you may have, a disability (e.g. mental health, attentional, learning, vision, hearing, physical, medical, or temporary), you are invited to contact Student Accessibility Services to arrange confidential discussion at (204) 727-9759. If you are registered with SAS and have a letter requesting accommodations, you are encouraged to contact the instructor early in the term to discuss the accommodations outline in your letter. Additional information is available at the Student Accessibility Services website.

Psychology Department Statements Regarding Rewrites & Waiving Pre-Requisites:
The Psychology Department does not permit individual student rewrites of any exams (or any other alternate form of assessment).

The Psychology Department will not waive prerequisites unless the student can display sufficient background knowledge and/or experience. The student must provide the request to the department in writing for approval with appended documentation.

Letter Grade Equivalents:

A+ 90-100%	B+ 75-79%	C+ 61-64%	D 50-53%
A 85-89%	B 70-74%	C 57-60%	F Below 50%
A- 80-84%	B- 65-69%	C- 54-56%	