

82:251 – FUNDAMENTALS OF PSYCHOLOGICAL RESEARCH II – A01

Winter Semester: January 12th – April 12th 2022
Lectures: Mon, Wed, and Fri: 1:40pm – 2:30pm
Labs: Thursdays: 1:40pm – 4:00pm

Instructor: Nicholas Watier, PhD
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Format: Lectures Conducted Through Zoom; Labs Take-Home
Moodle for all course announcements, grades, assignments, lab reports, and lecture recordings (moodle.brandonu.ca)

Office hours: I am available by appointment

Course Description (from the course calendar): Prerequisite: 82:250. This course will deal in detail with several types of research designs that are widely employed in Psychology. These designs will be examined in terms of the underlying rationale, the advantages and disadvantages, the empirical and statistical procedures, and the interpretation of the data obtained from the designs. Topics to be dealt with include randomized and matched two- group designs, one-way designs, two-factor factorial designs, within subject designs, Solomon 4-group design, quasi-experimental designs, and small-n designs. (Required for all Psychology majors and normally to be taken during the second year of the student's program). 3 lecture hours per week, 3 laboratory hours per week, one term.

Course Description (from the perspective of the instructor): Now the fun begins. We will be incorporating everything that you have learned in *Fundamentals to Psychological Research I* to discover new tools and techniques that describe, summarize, visualize, analyze, and generalize data from psychological research. We will spend a considerable amount of time focusing on how to determine if the results from an experiment are due to a treatment effect or simply due to chance, and whether or not we are justified in generalizing the results from a sample to a population. More poetically, we will be learning why calculating the mean of means, the mean of variances, the variance of means, and sometimes the variance of variances results in something meaningful. **Wild speculation and conjecture is encouraged.** Emphasis will still be placed on conceptual rather than computational understanding.

At the end of the course, if you gave an honest effort and asked a lot of questions, then you should be able to:

- ❖ Determine which statistic is appropriate for different research scenarios
- ❖ Correctly interpret the outcome of a particular statistical test
- ❖ Understand why a particular statistical tests results in something meaningful
- ❖ Understand how the conceptual meaning of a statistic relates to its formal (i.e. mathematical) meaning

Textbook: While a textbook is not required for this course, the following textbook is recommended: Gravetter, F.J., Wallnau, L.B., Forzano, L.B., & Witnauer, J.E. (2020). *Essentials of Statistics for the Behavioral Sciences (10th Ed)*. Belmont, CA: Wadsworth. If you have access to an earlier edition, feel free to use it. If you have another statistics textbook that suits your learning style and overlaps with the content of this textbook, you can use it. Past students have done well in the course without the textbook, whereas others have indicated that the textbook was critical in obtaining an 'A' grade. I personally think that the practice questions in the textbook are alone worth the cost.

Evaluation: Eight laboratory reports, two tests, and one final exam. Each lab report is worth 2% of your final grade. The tests are each worth 22%, and the final exam is worth 40%. The tests and final exam involve short

answer and calculation questions. You may be required to use the library to obtain a specific journal article and answer questions pertaining to it.

| Evaluation Item | Course Material that the Item will Cover | Anticipated Due Date | Proportion of Final Grade |
|-----------------|--|-------------------------------|---------------------------|
| Test 1 | Topics: 1, 2, 3, 4 | ♥ February 14 th ♥ | 22% |
| Test 2 | Topics: 5, 6, 7 | March 23 rd | 22% |
| Lab Reports | Labs: 1 to 8 | Mondays | 16% |
| Final Exam | Everything | April 21 st | 40% |

Delivery: The tests and final exam are take-home. **Each student must submit his/her own answers to the tests (see the instructor statement below on Academic Integrity).** The anticipated due dates for the tests are presented in the table above. **Note that the dates are subject to change.** In any case, I will try my best to give you at least one week to complete the tests. Reviews will be held during the lab period prior to the due dates for the tests. Plan accordingly.

Only under extraordinary conditions, such as illness, bereavement, or religion, will you be allowed to submit the test after the due date. **Documentation is required in order to schedule an extension.** If no documentation is provided, you risk receiving a grade of zero. **If you are unable to submit an evaluation item, you must notify the professor prior to the due date, otherwise you will receive a zero.**

Labs: The laboratory component will primarily focus on practicing the analyses that are presented during class. Instructions and questions for each lab will be posted on Moodle by Thursday of each week. The answers to the lab questions must be submitted in Moodle on the following Monday.

Content: The course is structured into four parts. The first, which will last until the end of January, will largely focus on a review of descriptive statistics and on applying the Null Hypothesis Framework to single-sample designs. The second, which will last until the end of February, will focus on single factor experimental designs with only two levels. Attention will then shift to single factor designs with multiple levels and two-factor designs, which will last until the end of March. Finally, the course will end with correlation analyses.

Course Outline (approximate temporal sequences of Lectures and Labs)

| Topic # | Lecture Title | Chapters |
|---------|--|------------|
| 1 | Review of Descriptive and Inferential Statistics | None |
| 2 | Errors, Effect Size, Power | Chapter 8 |
| 3 | Single Sample T-Test | Chapter 9 |
| 4 | Confidence Intervals | Chapter 9 |
| 5 | Independent-Measures T-Test | Chapter 10 |
| 6 | Repeated-Measures T-Test | Chapter 11 |
| 7 | One-Way ANOVA | Chapter 12 |
| 8 | Repeated-Measures ANOVA | None |
| 9 | Introduction to Factorial Designs | Chapter 13 |
| 10 | Correlation | Chapter 14 |

| Lab # | Lab Title |
|-------|--|
| 1 | Review of Descriptive and Inferential Statistics |
| 2 | Null Hypothesis Testing and Errors |

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|---|--|
| 3 | Single Sample T-Test, Power, & Effect Size |
| 4 | Independent Measures T-Test |
| 5 | Repeated Measures T-Test |
| 6 | One-way ANOVA |
| 7 | Repeated-Measures ANOVA |
| 8 | Correlation |

How to Succeed: Think, speculate, discuss, attend class, read a textbook, complete the practice questions at the end of the textbook, practice, practice, practice, practice, ask questions, ask questions, ask questions, ask questions, ask questions, ask questions, ask questions, ask questions, give yourself plenty of time to complete the tests and assignment, and most of all, **practice and ask questions**. Statistics is a hierarchically organized and cumulative discipline. If you don't grasp the basics (i.e. mean, variability, standardization, inference using a normal curve), then the more complex topics will seem herculean. Constantly working on practice problems and reflecting on your understanding is crucial. If I do a poor job of explaining something, tell me. If you don't quite fully understanding something, ask a question. If I can't answer the question in class, arrange to meet with me to go through it in more detail. This is especially important at the beginning of the course. Most statistical concepts build on antecedent statistical concepts; consequently, it is critical that you pay attention and consistently reflect on your understanding. **I strongly encourage you to complete the practice questions at the end of the textbook.** If you can complete those questions and you understand the answers, then the tests and final exam will be much easier to complete.

Calculator: A scientific calculator would be helpful for this course. Some questions on the test require calculations that would be tedious and time consuming to do by hand. Some of the lectures will require calculations to be completed during class.

Mathematics: Appendix A of the textbook contains an excellent mathematics review. You will be expected to know the order of operations and how to use fractions, decimals, proportions, exponents, roots, and algebra to solve linear equations with one unknown (e.g. $2x = 6$, what is x ?).

Attendance: All of you are autonomous, independent, and capable of making your own decisions as to how you should spend your time and money, but remember this: You paid approximately 500\$ for this course, and not only will you learn something, but you might actually enjoy it as well, so I encourage you to attend class.

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:

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|------------|-----------|-----------|-------------|
| 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% | |

Academic Integrity: Academic fraud will not be tolerated. Academic fraud includes, but is not limited to: plagiarism, cheating, submitting assignments from other courses, and falsifying research data. It is very easy to search for a sentence in Google to see if a student copied from another source.

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.

Statement on Academic Integrity (from the Instructor): Most of the evaluations 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 an in-class test. You will rarely ever be in a position where you only have 50 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 cheating. **Students that are suspected of copying off each other or submitting answers that are suspiciously similar to other students will risk failure in the course and dismissal from the university.** Every year - E-V-E-R-Y Y-E-A-R! – at least one student tries to cheat on the evaluation items. Do not be seduced into thinking that you will not face any consequences.