PSYC.4100 **2017-2018**

DATA ANALYSIS AND RESEARCH METHODS: COURSE OUTLINE

Classes:	Mon	10:30-12:20	3D04	Review Labs & Lecture
	Wed	10:30-12:20	3D04	Lecture
	Fri	10:30-11:20	3D04	Tutorial Lab
	Fri	11:30-12:20	4L29	Computer Lab

Instructors: Fall Jim Clark, 4C78A, 204-786-9757, j.clark@uwinnipeg.ca
Office hours: Mon 9:30-10:10am or by appointment
Winter Mike Halldorson, 4L04D, 204-786-9432, m.halldorson@uwinnipeg.ca
Office hours: TBA

Lab Instructor: Aynslie Hinds, 4L33, 204-250-8325 a.hinds@uwinnipeg.ca
Office hours: Fri 9:30-10:20am or by appointment

Course Website: www.uwinnipeg.ca/~clark/teach/4100/

Listserv: Students will be added to a listserv psy4100@uwinnipeg.ca that can be used to distribute messages about the course from instructors and students. People on the list can send an e-mail to this address and it goes to everyone. Be careful responding to these messages!

Text: Clark, J. M. (unpublished). *Intermediate statistics: Multiple regression and analysis of variance with SPSS*. [text available on-line for $20 each term and also in print for additional $20 each term]

PSYC-4100(6) INTERMEDIATE RESEARCH DESIGN AND DATA ANALYSIS (Le3, La3) This lab course extends the basic research and data analysis methods introduced in 2101/3 and 2102/3. Topics in this course include intermediate research methods (e.g., computer-aided research design and literature search, construct validity), intermediate data analysis methods (e.g., analysis of variance and partial/multiple correlation techniques for selected experimental and non-experimental designs), and current issues in social science methodology. The lab component provides opportunities to design, execute, analyze, and report the results of behavioural research, and emphasizes the use of computers in research design and data analysis (e.g., the use of such statistical packages as BMDP, SAS, and SPSS). This course is required of all students in the Psychology Honours program. Prerequisites: PSYC-2102(3).

Evaluation:

The course consists of six units on statistics, three each term. Between units, there will be one week to work on assignments, to cover related research methods, and to work on the term project. The attached schedules show tentative dates for various class activities and for evaluations.

Grades will be based on six assignments (three per term, worth 6.5% each), two term tests (worth 25% each), and a report (worth 11%). Assignments involve interpretation and explanation of analyses for simulated data. Although demanding and of modest value, assignments play a major role in understanding the course material and learning the material to do well on tests.

The Fall Schedule shows dates for assignments, tests, and reports for the Fall Term. The maximum mark for late assignments will be 100% - 2%*number of days late (e.g., an assignment handed in two weeks (14 days) after the due date will be worth 72%, so someone getting 70% on the assignment will receive a mark of 70*.72 = 50.4% for that assignment). More detailed instructions on assignments and reports are presented later.

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You will have up to two opportunities to complete a report, once at the end of each term. Reports must be typed in APA Style. Those completing the first report in the fall can try to improve their mark by doing a second report in the spring if they choose. Students completing only the spring report will ***not*** have a second opportunity to complete the report. See later for more information on reports.

Tests are three hours (plus 20 minutes usually) and involve explanations of computer printouts and other analyses, calculations to further your explanations, and perhaps a few short answer and essay types of questions on statistical and nonstatistical material covered in the course. You are responsible for all material covered in assigned readings, handouts, and lectures. For tests, you will have copies of relevant formulas and should bring a calculator (unless you prefer doing arithmetic by hand). Photo ID may be requested.

In addition to these evaluated activities, I will assign various classroom exercises (e.g., finding and reviewing articles, suggesting items for questionnaires, collecting class data). Although not formally marked, I consider participation in these exercises and completion of all work when deciding about final adjustments to marks (e.g., bonus marks to increase class average, if needed, are normally assigned only to students who participated fully in class activities).

Grade Cutoffs:

A+	90-100	B+	75-79	C+	65-69	D	50-59
A	85- 89	B	70-74	C	60-64	F	0-49
A-	80- 84						

The following table shows sample calculations for two hypothetical students.

	Assign's	Report	Tests		Mark	Grade
Weight	(39%)	(11%)	(50%)		(100%)	
Student A	70%	72%	67%	71%	69.72	B
Student B	83%	84%	76%	85%	81.86	A-

The final mark of 69.72 for student A equals .39*70 + .11*72 + .25*67 + .25*71. Without any adjustments, the final grades would be as shown in the final column. Note that the final grades that I submit are tentative until approved by Senate and can be adjusted in either direction by the Department or Senate.

The final date for withdrawal without academic penalty is 14 February 2018.

PSYC.4100 RESEARCH DESIGN AND DATA ANALYSIS 2017-2018

FALL TERM SCHEDULE (SUBJECT TO MODIFICATION AS NEEDED)

Sep	06W	Introduction: Class Organization, Texts A Defence of Scientific Psychology, the importance of Numeracy
	08F	T-Lab: Summation Notation, Calculations **[Bring calculators to all labs]** C-Lab: Introduction to various computer systems and software

Unit 1: Clark Chapters 1 to 6

Sep	11M	Descriptive Statistics Project: Overview, Brief discussion, Literature Search, Questions
	13W	Hypothesis Testing: Single mean and differences between two means (t & F)
	15F	T-Lab: Calculations for Descriptive Statistics and Single tests C-Lab: Descriptive statistics and Single Sample Tests with SPSS ***Initial Questionnaire Ratings Due (Qualtrics)***
Sep	18M	Bivariate Correlation and Regression
	20W	"
	22F	T-Lab: Calculations for Correlation and Regression C-Lab: Correlation and Regression with SPSS ***Literature Reviews Due***
Sep	25M	Measurement, Discuss Literature Reviews
	27W	Discuss Literature Reviews and Select Constructs for Fall Project
	29F	Work on Assignment 1

Unit 2: Clark Chapters 7 to 10

Oct	02 M	Multiple Regression: MR Equation, SSs
	04 W	Multiple Regression: Significance, F, Strength, R^2
	06 F	T-Lab: Calculations for Multiple Regression C-Lab: Multiple Regression with SPSS ***Preliminary items for Project 1 (by e-mail)***
Oct	***9-13***	***Fall Reading Week***
Oct	16M	Significance of Regression coefficients
	18W	SS Change and significance of Regression coefficients ***Assignment 1 Due***
	20F	T-Lab: Calculations for Significance and SS Change C-Lab: Significance in SPSS
Oct	23M	Part Correlation
	25W	Partial Correlation
	27F	T-Lab: Part and Partial Correlations C-Lab: Part and Partial Correlations in SPSS

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Oct	30M	Correlating Original and Derived Scores
Nov	01W	More on Strength of Predictors
	03F	T-Lab: Strength of Predictors
		C-Lab: Derived Scores and Part/Partial Correlations with SPSS
		Second Questionnaire Ratings Due (Qualtrics)
Nov	06M	Ethics principles and procedures
	08W	Scientific Writing, APA style, and Data Presentation
	10F	Work on Assignment 2

Nov 1 3 6 8 10 13 15 17 20 22 24 27 29
Dec 1 4

Unit 3: Clark Chapters 11 to 15

Nov	13M	Multiple Predictors
	15W	More on Multiple Predictors
	17F	T-Lab: Calculations with multiple predictors
		C-Lab: SPSS Analyses with multiple predictors
Nov	20M	Automated statistical selection procedures
	22W	More on automated statistical selection procedures
		Assignment 2 Due
	24F	T-Lab: Understanding Automated procedures
		C-Lab: Multiple Predictors and Automatic Selection procedures in SPSS
Nov	27M	Nonlinear Relations
	29W	Categorical Predictors and Interactions
Dec	01F	T-Lab: Nonlinear Relationships, Categorical Predictors, and Interactions
		C-Lab: Nonlinear Relationships, Categorical Predictors, and Interactions with SPSS
Dec	04M	Review Lab, Review class, Discuss reports
Dec	06Tu	Practice Test (Tue schedule, replaces Remembrance Day)
Dec	***15F***	***9am-12:20, Test #1 (preliminary date)***
Dec	***18M***	***Assignment 3 Due (keep copies or rerun SOME analyses for Report 1)***
Jan	***08M***	***Report 1 Due: Students who submit Report 1 will have an opportunity in term 2 if they choose to write Report 2. Students who do NOT submit Report 1 will ONLY have a single opportunity in term 2 to submit a Report.***
Feb	***14***	***Final date to withdraw from 2015-2016 full-year F/W courses***

PSYC.4100 DATA ANALYSIS AND RESEARCH METHODS 2017-2018
TENTATIVE WINTER TERM 2 SCHEDULE

Week of	
Jan01F	Introduction to Term 2
Jan08MWF	Introduction to Independent (Between-Subjects) ANOVA; ch 1, 2, 3 TLab: Notation and Calculations for Independent ANOVA CLab: SPSS commands for Independent ANOVA
Jan15MWF	Post Hoc and A Priori Multiple Comparisons; ANOVA with Multiple Regression; ch 4, 5, 6 TLab: Multiple Comparison Calculations CLab: SPSS commands for Post Hoc and A Priori Multiple Comparisons, and Multiple Regression ***Jan 11 Mon - Report 1 due***
Jan22MWF	Basics of Experimental Design, Discuss Winter Project Using Computers for Randomization and Counterbalancing (2 hours) Lab: Work on Assignment 4 ***Jan 22 - One-page review of attitude change article due***
Jan29MWF	Between-Subjects Factorial ANOVA; ch 7, 8 TLab: Calculations for Factorial Comparisons CLab: SPSS and Factorial Comparisons
Feb05MWF	Post Hoc and Planned Comparisons for Main Effects; Simple Effects for Interactions; ch 9, 10 TLab: Calculations for Factorial Comparisons CLab: SPSS and Factorial Comparisons ***Feb 09 - Assignment 4 Due***
Feb12MWF	Partitioning the Interaction, Regression analyses for Factorial designs; ch 10, 11 TLab: Calculations for Simple Effects and Partitioning Interactions CLab: Simple Effects and Partitioning Interaction with SPSS ***Feb14 - Final Date to Withdraw from Sep-Apr Courses without Academic Penalty***
Feb 19MWF	***Reading Week***
Feb26MWF	Ethics, Effective Spoken Presentations, Discuss Project Reporting ANOVA Results in Text, Tables, and Figures Lab: Work on Assignment 5
Mar05MWF	Within-Subject ANOVA and Comparisons; ch 12, 13 TLab: Calculations for WS ANOVA CLab: SPSS and WS ANOVA ***Mar 09 - Assignment 5 Due***
Mar12MWF	WS Factorial designs and follow-up analyses; ch 14, 15 TLab: Calculations for WS Factorial CLab: SPSS and WS Factorial
Mar19MWF	Mixed Factorial ANOVA and Higher Order Factorial Designs; ch 16, 17? TLab: Calculations for Mixed ANOVA CLab: SPSS for Mixed ANOVA and Higher Order Factorial Designs
Mar26MW	Review lab; Overview of ANOVA designs ***Mar30 - Good Friday No Classes***
Apr02M	Review Class; Discuss Assignment 6 and Report 2
Apr04W	Practice Test 2, Part 1
Apr05Th	Practice Test 2, Part 2 (Friday schedule, make up day for Good Friday)
Apr 13F	***9:00am-12:20, Test #2 (preliminary date)***
Apr 16M	***Assignment 6 Due***
Apr 20	***Report 2 due***

ADVICE ON ASSIGNMENTS

Definitely one challenging aspect of 4100 are the assignments, which can take much time and effort to complete but are each worth “only” 6.5% of your final mark. Here are some suggestions that might help to make the assignments more manageable.

1. Keep in mind that six times 6.5% is 39%, a substantial portion of your final grade. So it is important to submit something for each assignment, ideally in a timely fashion to not lose marks.

2. Working on assignments serves two purposes; one is to evaluate your current understanding of the current material so that you are prepared when we move on to topics that build on that material, and a second is to learn the material (i.e., study) in preparation for the end-of-term tests (and for any future use of statistics, such as your thesis). So the time you commit to assignments has both short-term and several long-term benefits.

3. With respect to preparing for tests, remember that you are going to have limited time for the tests (at most three hours and twenty minutes). It is therefore important to learn what is important and gain some experience at communicating that important material in a succinct manner. Try to avoid a “shotgun approach” to assignments that includes excessive amounts of verbal material in the hopes that important points are buried somewhere. Copying substantial sections from lecture notes or the text does not help you to capture the important ideas in your own brief words, which required to do well on the tests.

4. To encourage conciseness, markers will consider how well students have achieved a succinct and clear explanation of the important concepts.

See the later section on “How to Succeed in 4100" for other more general suggestions (e.g., working in groups, not procrastinating).

PSYC.4100 **Data Analysis and Research Methods**

FALL TERM RESEARCH PROJECT

PREDICTORS OF ATTITUDES TOWARD SCIENCE

Each term the 4100 class performs or simulates a group research study. As a class we review the literature, decide on the research design, develop measures, complete ethics forms, collect data, enter data, and analyze the overall results. Students then write individual reports based on a sample of data selected randomly from all of the observations collected and analyzed by the class. The actual analyses are also used for Assignment 3.

The first term involves a nonexperimental project in which we will examine correlates of attitudes toward science (the dependent or criterion variable), including such aspects as whether or not science is a generally valid way of learning about the world (including people).

I chose this topic for several reasons. First, there are many people (including academics and psychologists) who have been quite critical about science as a valid way of knowing, arguing that science is just one of many equally-valid (or equally invalid) methods, that science is Eurocentric and a tool for domination of women and minorities (or other cultures in general), and that in general science does not deserve any "privileged" epistemological status. Second, psychology itself is divided with respect to the proper relationship between its scientific and applied components. Clinical psychology is based less on science than many non-clinicians (and some clinicians) think is appropriate, and scientific psychology is irrelevant in the minds of many clinicians (and some scientists). Attitudes toward science is therefore an important issue for psychology students.

We will develop a measure of people's current attitudes toward science (i.e., how positively or negatively they view science), as well as measures of predictors that we think might account for differences among people in their beliefs about science. One predictor that we will examine more closely in the fall term is religiousness, although this is a controversial topic. Previous studies that we have conducted have found a negative correlation between religiousness and beliefs about science. Moreover, scientists are more likely to be non-believers than is observed in the general population. The project will involve the phases enumerated below. Dates for major activities are indicated on the class schedule, and we will also talk about the project for short periods in other classes.

1. Review Literature

Each student will use various library resources, especially PsycInfo, to find an empirical (i.e., research) article related to the criterion variable or some predictor of interest that we have identified. Special attention should be paid to studies that identify the mechanisms underlying the observed or hypothesized relationships (i.e., studies that help us understand why the specified relationship occurs). Students will write ***brief summaries*** of their article, including: a full reference for the study in correct APA style, rationale, method, results, conclusions, and evaluation of the study. See the schedule for the due date of the summaries and the day on which they will be discussed in class. ***Be prepared to review briefly your summary in that class.***

2. Design Study and Develop Measures

The class will select a manageable design that will further our understanding of the criterion variable and its correlates. This might involve replication of previous research or a novel question. As well as measures of the criterion variable, the class will develop measures for the other constructs involved in our hypotheses. The schedule contains expected dates to develop measures, finalize the method, and complete ethics and subject pool procedures.

3. Collect Data

Time permitting, ethical approval will be obtained from the appropriate Ethics committee(s), materials prepared, and tests administered to subjects from the Introductory Psychology subject pool. The raw data will be checked and entered. These tasks will be distributed among students, probably at other times than regular classes. If time does not permit collection of data, I will simulate our study.

4. Analyze Results

Students will be given individual samples of observations from the class data (or the simulation) and will analyze their own data using the statistical techniques learned this term. Preliminary analyses will include descriptive statistics and frequency distributions. Relationships will be examined by plots, correlations, and regression methods. We will evaluate the support for the various hypotheses, and propose additional research. Assignment 3 will specify some of the analyses.

5. Prepare Individual Reports

Students will write brief reports (about 8 pages of text) based on their own findings in correct American Psychological Association (APA) publication style. A later class and chapter will discuss APA style. The report will include: Title Page, Abstract, Introduction, Method, Results, Discussion, and References. This report (or the term 2 report) will be worth 11% of your final mark in the course. Other activities for the project are not explicitly marked, but records of student participation will influence any adjustments to marks at the end of the year (e.g., only active participants may receive added marks).

You should base your report on the following materials.

1. Initial outline of report activities (above).

2. The one-page literature summaries completed by the class, including our in-class discussions of the literature reviews and the variables. You do not need to use all of the summaries, only those relevant to your version of the study. Literature reviews can be found at www.uwinnipeg.ca/~clark/teach/4100.

3. The various methodological chapters and handouts discussed during the term. Written materials on the following topics are available at www.uwinnipeg.ca/~clark (follow the Research Links link): Measurement, Ethics, Writing in APA style, and Scientific Writing.

4. The data for Assignment #3. You must use at least two predictors in the analyses that you report. Note that you are writing an APA style report, not explaining the analyses of the data.

5. If we end up simulating the study, you should be "creative" when you write up your report, especially about the many unspecified aspects of the study (e.g., who subjects were, how recruited, number of items on tests, reliability, ...). But do try to be realistic as well!

A NOTE ON HOW TO SUCCEED AT 4100

Experience teaching this course over many years suggests that there are some tried and true methods for succeeding at 4100. Here are a few suggestions. ... Jim

1. **Work hard from the start** of the course. Quantitative courses are cumulative in nature, often in ways that may not be true in other classes where you can understand later material without first grasping earlier material. In quantitative courses, even ones like 4100 that involve little math (see 10), later material can be complete nonsense without understanding earlier work.

2. **Participate fully in classes**, both lectures and labs. Attend class and sit where you can see and hear what is going on. Don't position yourself somewhere or engage in activities that will only lead you to become distracted from class. If you do not understand something or it is not clear, then ask questions. Invariably you will find that other students had the same questions and they will appreciate your initiative. Engage with the activities (e.g., SPSS commands) even if they appear overly simple to you. The more automatic everything becomes, the easier later material will be and the better you will do.

3. **Focus on understanding formulas**. Much course knowledge can be summarized in a few pages, but this is only true if the formulas are meaningful, rather than random scribbling. Part of the secret again is to appreciate the cumulative nature of formulas. You learn basic calculations for values that then appear in more complex formulas. A good analogy is reading; good readers understand letters (the symbols) and words (groups of symbols), which enables them to understand more complex units (sentences, paragraphs, ...). The more automatic each level of the process, the greater the cognitive resources available to understand and think about the meaning of larger units. And formulae do have meanings!

4. **Work in groups**. There are several benefits to working outside of class in groups. One benefit is that it increases the odds that someone understands the material, can answer a question, or can steer things in a constructive direction. This reduces situations in which students cannot proceed because they don't know how to get started. And trying to explain material to other students also benefits the "teachers," who must think about and articulate more fully their own understanding. Another benefit is motivational. A group can keep everyone motivated to engage in the work necessary to succeed in courses like 4100. Some caution is necessary, of course, because groups could become distractions. Finally, you will get to know some students very well, forming friendships that often last for a long time.

5. **Statistics is best learned by DOING, not just by reading or listening**. One major way to practice doing statistics is the Assignments. The time you put into applying the material covered in the text, lectures, and labs is time well spent because you are using the concepts to analyze realistic data. The Labs provide another opportunity to do statistics, not only in the lab itself but following the labs. Labs are offered on Fridays and we take up the labs on Monday, the first hour of lecture. There is often not enough time on Friday to complete all the lab in detail or to draw correspondences between the tutorial and computer sections. It is worth while to complete the labs before they are taken up on Monday. You will learn far more actively doing the labs yourself than simply receiving the answers in class. You will also have a chance to prepare questions about the lab that can then be answered in class on Monday.

6. **Read the text**. Material presented in class and labs is elaborated more fully in the text. Spend time working your way through the text, ideally before the relevant lecture and lab. Another advantage of reading the text is that the examples used there are different than the examples used in lectures and labs. One strategy that is often recommended for reading texts is to skim over the unit of material you are studying first, and then read it more closely on a second reading. The pre-reading gives you an opportunity to form an overall conceptual scheme for the material.

7. **Avoid procrastination!** One of the major challenges for many people is to get themselves going on demanding tasks, such as 4100 Assignments or the Report. But the longer such tasks are put off, the more daunting they can become given the demands of the task remain the same while the time has diminished. A strategy that has been found to work for procrastination problems is to break larger tasks into more manageable pieces and pick away at those in a timely fashion. The starting point for Assignments, for example, might be to write the SPSS commands that generate the simulated data. This necessary and tangible step can be completed in little time, and makes a good first stage. You will also see concretely the data that you will be working with for the questions. Each question might then constitute a subsequent series of steps that can be scheduled in such as way as to finish the Assignment in the allotted time. Writing a paper or other complex tasks can be similarly broken down into stages.

8. **Calculators and Computers are your friends!** But like friends, you have to know them well to gain the most out of them. Spend time learning the functions on your calculator; if like most of us you have long ago "misplaced" the manual for your calculator, use Google to track one down. Practice operations repeatedly so that they become automatic before you have to use them in situations where you have limited time (e.g., tests?). Similarly, it is helpful to become proficient at getting the computer to do what you want, whether it is to enter data, to generate a table or graph, or to perform some analysis.

9. Understand that certain aspects of the course are meant to link being an undergraduate student with being a good graduate student or employee. Whether you proceed to graduate school or to work or to life more generally, you will find that there is not always someone there to explain how things work or to guide you through a process. **You will often need to learn how to do things on your own.** That is why one of the top qualities employers look for in employees is the ability to learn independently. You may be frustrated at times by us answering a question with a question or providing indirect answers (e.g., ideally, how to answer the question for yourself), but there is a rationale for it. Push that frustration aside or use it (e.g., "I'll show him") to figure out how to answer your own questions.

10. On a related theme, **avoid various sorts of negative self talk.** Sometimes students think that they "can't do math" or that "learning this junk is irrelevant." There is little to gain by engaging in such negative ruminations, and much to lose. Such thoughts are distracting, and rather than energy and cognitive resources being devoted to learning, they are frittered away in unproductive activity. And such beliefs are often untrue; for example, statistics as taught in 4100 is more a way of thinking than math, and past difficulties with math courses may have been due to instruction or work habits. Keep a positive attitude and you will find work easier than it might otherwise be; note I said "easier" not "easy!"

University Regulations & Additional Information

Withdrawal dates for the academic year can be found at:
http://www.uwinnipeg.ca/index/services-withdrawal-schedules

Students should be familiar with the Regulations and Policies section of the Course Calendar dealing with academic regulations and policies, including Senate appeals and academic misconduct (e.g. plagiarism, cheating). See:
http://www.uwinnipeg.ca/academics/calendar/docs/regulationsandpolicies.pdf

All students, faculty and staff have the right to participate, learn and work in an environment that is free of harassment and discrimination. The UW Respectful Working and Learning Environment Policy may be found at:
http://www.uwinnipeg.ca/respect

Students may choose not to attend classes or write examinations on holy days of their religion, but they must notify their instructors at least two weeks in advance. Instructors will then provide opportunity for students to make-up work and/or examinations without penalty. A list of religious holidays can be found at:
http://uwinnipeg.ca/academics/calendar/docs/important-notes.pdf

Students with documented disabilities, temporary or chronic medical conditions, requiring academic accommodations for tests/exams (e.g., private space) or during lectures/laboratories (e.g., note-takers) are encouraged to contact Accessibility Services (AS) at 204-786-9771 or accessibilityservices@uwinnipeg.ca to discuss appropriate options. All information about a student's disability or medical condition remains confidential. See:
http://www.uwinnipeg.ca/accessibility

Students facing a charge of academic or non-academic misconduct may choose to contact the University of Winnipeg Students' Association (UWSA) where a student advocate will be available to answer any questions about the process, help with building a case, and ensuring students have access to support. For more information or to schedule an appointment, visit our website at www.theuwsa.ca/academic-advocacy or call 204-786-9780.