Instructor: T.B.D.

Lectures: Three one-hour lectures a week

Tutorial/Laboratory: One two-hour combined tutorial/computer laboratory a week

Office Hours: T.B.D.

Teaching Assistants: T.B.D.

Course Website:

Information about the course, including lecture notes and handouts for the laboratories, will be available on McMaster’s Avenue to Learn system. The course will appear as PNB 2XE3: Descriptive Statistics and Research Methods under the “My Courses” section.

Course Description:

Students will learn descriptive, graphical, and exploratory data analysis with an emphasis on how computers are used to collect, archive, and process data.

*** As of June 2020, it is intended that this course will be offered in-person in Winter 2021. ***

Intended Learning Outcomes Statistics:

By the end of this course, students should be able to:

1. Distinguish between a statistic of a sample and a parameter of a population.
2. Determine an appropriate measurement scale for given data.
3. Describe data distributions in terms of their shape and variability.
4. Interpret and create graphical displays of data, including boxplots, histograms, and scatterplots.
5. Compute the correlation coefficient (r) between two variables as well as fit the regression line that predicts one variable from another. Understand the principles of multiple regression.
6. Compute z-scores.
7. Define probability and identify how it underlies p-values and odds ratios.
8. Describe sampling, the central limit theorem, and confidence intervals.
9. Describe general hypothesis testing and use a one-sample t-test as an example.
10. Perform two-sample t-tests and interpret effect sizes.
11. Use computer programs including Excel and R to organize and visualize data, and perform statistical analyses.

Intended Learning Outcomes Research Methods:

By the end of this course, students should be able to:

1. Demonstrate critical thinking in identifying strengths and weaknesses of different research designs.
2. Define validity and reliability.
3. Understand issues relevant to making inferences from data.
4. Understand the pros and cons of experimental and non-experimental designs.
5. Learn how to plan and interpret data from experimental and non-experimental research.
6. Understand researchers’ ethical obligations.
Text:

There is no formal textbook for this course. The notes are intended to be comprehensive, but students are encouraged to turn to other sources on introductory statistics if they feel they need an expanded explanation of concepts.

Two suggested statistics texts are:


A suggested research methods text is:

Price, Jhangiani & Chiang (2016). Research Methods in Psychology, 2nd Canadian Edition. This is a free, open-access textbook available for download from: https://opentextbc.ca/researchmethods/

Laptops and Software:

Students will work on their own laptops for the weekly computer exercises. This learning will be self-paced, with an optional review of the material during the weekly lab times. We will be using Microsoft Excel and R, which can run on either Windows or Mac systems. Students who do not have Windows or Mac laptops should contact the instructor for accommodation.

We will use R version 3.6.2. This software is open-source and can be downloaded and installed from:

https://cloud.r-project.org/

We will also use Microsoft Excel. McMaster students can download this from:

https://www.mcmaster.ca/uts/licensing/msstudents.html

Please install the desktop version of Excel if you don’t already have it – the online Excel 365 is missing features we need for the labs.

iClickers:

Classroom response systems will be used in lectures. Students should purchase an iClicker at the Campus Bookstore (McMaster’s main bookstore). iClicker questions will serve as real-time feedback for students and the Instructor.

Throughout the course, we will use the iClicker system to generate data for use in computer labs. All such data will remain confidential and will be anonymized (i.e. not linked to your MacID). Data collected will solely be used for instructional purposes, and will not be distributed or reproduced. You are not required to answer any questions that make you feel uncomfortable.

Evaluation:

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<thead>
<tr>
<th>Evaluation Type</th>
<th>(% of final grade)</th>
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<tbody>
<tr>
<td>Research Methods Assignments</td>
<td>15</td>
</tr>
<tr>
<td>Lab Programming Tests</td>
<td>20</td>
</tr>
<tr>
<td>Midterm</td>
<td>30</td>
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<tr>
<td>Final Exam</td>
<td>35</td>
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Homework Assignments:
Each week, the instructor will post onto Avenue a set of practice written questions covering the statistics content in the course. These will not be marked, but answers will be taken up in class or in the tutorial.

Research Methods Assignments:
The instructor will assign take-home assignments on concepts covering research methods. These will be collected at the beginning of a subsequent lecture and returned marked to students at their weekly tutorial. We will not accept late assignments handed in outside of the lecture.

Tutorials:
Students are required to attend their assigned weekly tutorials. The purpose of these are to (1) reinforce class content by reviewing the homework assignments and (2) introduce students to statistical software (Excel and R).

1. Tutorial portion
During the first portion of the tutorial, TAs will discuss the practice questions, and review important concepts from that week’s lectures. This is a great time to ask questions and get help!

2. Computer portion
At the beginning of each week, we will assign a computer exercise for the week that students can work on at their own pace. The computer assignments are designed to introduce students to statistical software (Excel and R), and to teach data handling techniques that will be helpful in future courses/research. During the tutorial, the TAs will review these exercises and answer questions. Please come to the tutorial having tried the exercise and make sure you understand each before leaving the tutorial session.

Lab Programming Tests:
There will be two 2-hr lab programming tests held during tutorial sessions, during which students will complete a modified version of one of the computer assignments assigned throughout the term. The completed lab will be due at the end of the lab session and will be graded by the TAs.
**ACADEMIC INTEGRITY**

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. **It is your responsibility to understand what constitutes academic dishonesty.**

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university. For information on the various types of academic dishonesty please refer to the [Academic Integrity Policy](https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/), located at https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one’s own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

**AUTHENTICITY / PLAGIARISM DETECTION**

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster’s use of Turnitin.com please go to [www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).

**COURSES WITH AN ON-LINE ELEMENT**

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

**ONLINE PROCTORING**

Some courses may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.
CONDUCT EXPECTATIONS
As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the Code of Student Rights & Responsibilities (the “Code”). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, whether in person or online.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students’ access to these platforms.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES
Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or sas@mcmaster.ca to make arrangements with a Program Coordinator. For further information, consult McMaster University’s Academic Accommodation of Students with Disabilities policy.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK
McMaster Student Absence Form (MSAF): In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar “Requests for Relief for Missed Academic Term Work”.

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)
Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

COPYRIGHT AND RECORDING
Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.
EXTREME CIRCUMSTANCES
The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.