1.0 CALENDAR DESCRIPTION
An introduction to measurement and analysis in health sciences research, covering topics such as validity, reliability, standard errors, confidence intervals, tests of means, correlation, and linear regression.

Prerequisites: Health Sciences 2801a/b or equivalent
Antirequisites: All other University-level statistics courses at the 2000-level or above

Note regarding prerequisite checking
Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2.0 COURSE INFORMATION
Instructor: Dr. Andrew Johnson
Arthur and Sonia Labatt Health Sciences Building, Room 330
ajohnson@uwo.ca

Office Hours: By appointment and via Zoom (see OWL signup for details)

Course Website: https://owl.uwo.ca

3.1 TEXTBOOKS

This textbook is licensed under a Creative Commons Attribution 4.0 International License, and may be downloaded for free at https://openstax.org/details/introductory-statistics

To facilitate your engagement with the text, I have set up an interactive reading space on Perusall.com that will feature “reading assignments” for each week of the course.
3.2 CALCULATOR
You will need a calculator with a “stats mode” for this course. The device should be easy to use – I would recommend that you avoid calculators that have functions and capabilities that are not required for this course. A calculator sufficient for this course should cost approximately $15 to $35. It is advisable to have your calculator available for all lectures, homework assignments, tests, quizzes, and assignments.

4.0 COURSE OBJECTIVES
In this course, you will be introduced to statistical analyses in the health sciences, with an emphasis on learning how the analyses are conducted by hand. By the end of the course, you will be comfortable with the theory and mechanics of calculating measures of central tendency and dispersion, standard scores, t-tests (both independent and dependent), bivariate correlation and regression, simple chi-square calculations for frequency distributions, and simple ANOVAs (both independent and dependent).

5.1 EVALUATION
Midterm #1    2021.02.12    15%
Midterm #2    2021.03.12    15%
Engagement with Readings  throughout the course   5%
Contributions to Self-Testing  throughout the course   10%
Online Quizzes  throughout the course   20%
Final Exam  TBA (during final exam period)  35%

Midterm #1: The first midterm for this course will cover all course material (in readings, supplemental materials presented through OWL, or in lecture videos) presented between 2021.01.04 and 2021.02.05 (i.e., up to and including our unit on the Central Limit Theorem). This test will consist of some combination of multiple-choice questions, short-answer questions, and calculation questions. You will probably want to have a calculator for this exam. You will have two hours to complete the examination, and the exam will be available between 9am and 1pm on February 12th, 2021 (i.e., you must complete the exam within that time frame). A link to the testing site will be posted to OWL.

Midterm #2: The midterm for this course will cover all course material (in readings, supplemental materials presented through OWL, or in lecture videos) presented between 2021.02.06 and 2021.03.05 (i.e., up to, and including, our unit on Two Sample Hypothesis Testing). This test will consist of some combination of multiple-choice questions, short-answer questions, and calculation questions. You will need a calculator for the exam. You will have two hours to complete the examination, and the exam will be available between 9am and 1pm on March 12th, 2021 (i.e., you must complete the exam within that time frame). A link to the testing site will be posted to OWL.

Engagement with Readings: As noted in Section 3.1, I have created a textbook reading space on Perusall.com, and have set up “reading assignments” for each week of the course. You will be divided into groups to collaboratively work through the readings on a weekly basis. To get started with this resource, you will need to create a free account with Perusall. The course code for this year’s course is JOHNSON-VZKF8. You will need this when setting up your account.

The goal within Perusall is to help you engage with the textbook by encouraging collaborative annotation of the readings with your classmates. This will facilitate targeted questions about the readings (i.e., by highlighting sections of the text that are confusing to you and asking questions directly within your readings). I’m also hoping that this will connect you with classmates while they...
complete the readings, and perhaps help each other with particularly difficult concepts. Finally…it will focus our discussions as a class (i.e., on the OWL forums) by highlighting information that is found to be problematic within the readings.

If you have something to share concerning material in the readings (be it a question, a clarification, a link to the class notes, or additional information that you might have picked up in your other courses), highlight the text and type in a comment as an annotation. You can also respond to a classmate’s annotation in real-time within conversation threads, and you can upvote questions that you find helpful. Good annotations contribute to the class by stimulating discussion, explaining your thought processes, helping others, and drawing attention to good points. If a particular classmate’s point is relevant, you can explicitly "mention" them and they will be immediately notified, even if they are not signed into Perusall.

Research has suggested that the following behaviors predict higher end-of-semester grades and long term mastery of the subject:
- Contributing thoughtful questions and comments to the class discussion, spread throughout the entire reading (see some examples)
- Starting the reading early
- Breaking the reading into chunks (instead of trying to do it all at once)
- Reading all the way to the end of the assigned reading
- Posing thoughtful questions and comments that elicit responses from classmates
- Answering questions from others
- Upvoting thoughtful questions and helpful answers

I will be using these behaviours to identify a grade out of 100% for your engagement with the readings.

Contributions to Self-Testing: One of the most frequent requests that I receive from students is for more sample questions. To address this need, we will be using PeerWise as a place for you to create, share and evaluate assessment questions with your classmates. Your grade will be based on the number and quality of the questions you create – as well as your review of (and comments on) questions created by your peers. For full marks, I expect that you will create an assessment question for at least 8 of the 12 weeks in the course, and that you will review at least 8 assessment questions posted by your classmates. I have posted a few questions to give you an idea as to what is expected. If everyone contributes fully to this activity, we will have more than 2000 questions in our course test bank by the time you are ready to self-test in preparation for the final exam.

Start by visiting PeerWise. If you have not used PeerWise before, just click the "Registration" link and follow the prompts to choose a username and a password for your account. If you have used PeerWise before, simply log in and then select "Join course" from the Home menu.

To access our course, "HS 3801B (January to April, 2021)", you will need to enter two pieces of information:
1. Course ID = 21459
2. Identifier = your UWO username (the part before the “@uwo.ca”)
   You don't need to (and probably shouldn't) use your UWO password when registering.

Online Quizzes: I have created several online quizzes to help you review exam material. These online quizzes will be strictly multiple-choice, and are (obviously) open-book examinations. You should plan
to use a calculator for all of these quizzes. My expectation is that you will do these quizzes individually, and not with your classmates. You will have 30 minutes to complete each quiz, and quizzes are due at 9:55pm on the dates noted within the course schedule. Each quiz may be submitted only once. Late quizzes will not be accepted, as question-level feedback will be released the day after each quiz is due. Students receiving academic accommodations, or who use self-reported absences for periods of time that include a quiz due date, will have the value of missed quiz(zes) distributed amongst the remaining quizzes. This adjustment will be done at the end of the course.

**Final Exam:** The final exam for this course will cover all material presented throughout the term. The exam will consist of some combination of multiple-choice questions, short-answer questions, and calculation questions. You will need a calculator for the exam. This exam will be held during the final exam period.

**NOTE:** Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

### 5.3 MAKEUP EXAM DATES / LOCATIONS

You must have a valid medical or compassionate reason for missing a scheduled evaluation, and documentation for your absence must be filed with the main office of the School of Health Studies. See section 7.2 of this outline for information concerning acceptable documentation of illness. Retroactive exam accommodation (i.e., for exams that have been written) will not generally be granted. Makeup examinations will consist of some combination of multiple choice questions, essay questions, and computational questions. **Makeup examinations are scheduled by the School of Health Studies. You will be given information as to the date, time, and location of the makeup examination after you have been granted permission to write the examination. **NOTE:** There is no second makeup examination for either of the midterms in this course. If you are unable to write a makeup examination as scheduled by the School (for any reason) the value of that exam will shifted to the final examination.

### 6.0 LECTURE / LAB SCHEDULE

<table>
<thead>
<tr>
<th>Lecture Topics</th>
<th>Text Reference</th>
<th>Online Quiz Due</th>
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<tbody>
<tr>
<td>2021.01.04   Sampling and Data</td>
<td>Chapter 1</td>
<td>2021.01.11</td>
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<tr>
<td>2021.01.11   Descriptive Statistics</td>
<td>Chapter 2</td>
<td>2021.01.18</td>
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<td>2021.01.18   Probability</td>
<td>Chapter 3</td>
<td>2021.01.25</td>
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<tr>
<td>2021.02.08   The Central Limit Theorem</td>
<td>Chapter 7</td>
<td>2021.02.08</td>
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<tr>
<td>2021.02.22   Confidence Intervals</td>
<td>Chapter 8</td>
<td>2021.02.22</td>
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<tr>
<td>2021.02.15   No class – Reading Week</td>
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<tr>
<td>2021.03.01   One Sample Hypothesis Testing</td>
<td>Chapter 9</td>
<td>2021.03.01</td>
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<tr>
<td>2021.03.08   Two Sample Hypothesis Testing</td>
<td>Chapter 10</td>
<td>2021.03.08</td>
</tr>
<tr>
<td>2021.03.08   Chi-squares and Count Data</td>
<td>Chapter 11</td>
<td>2021.03.15</td>
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<tr>
<td>2021.03.15   Linear Regression and Correlation</td>
<td>Chapter 12</td>
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<tr>
<td>2021.03.22   F-ratios and Independent ANOVA</td>
<td>Chapter 13</td>
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<tr>
<td>2021.03.29   Dependent ANOVA</td>
<td><em>No text reference</em></td>
<td></td>
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### 7.1 GENERAL COURSE NOTES
**Student Code of Conduct**
You are expected to comply with the Code of Student Conduct at all times when dealing with classmates and members of the instructional team. The purpose of this Code is to define the general standard of conduct expected of students registered at The University of Western Ontario, provide examples of behaviour that constitutes a breach of this standard of conduct, provide examples of sanctions that may be imposed, and set out the disciplinary procedures that the University will follow. For more information, visit http://www.uwo.ca/univsec/pdf/board/code.pdf.

**Course Website**
This course is “paperless” and as such OWL (and links on OWL) will be your sole source for lecture materials, readings, and course information (including this course outline). Due to privacy regulations, grades will only be provided to you through OWL – I will not, under any circumstance, convey grades via email or over the phone.

**Email**
I am happy to answer your questions via email. You must, however, use your UWO email address for all correspondence regarding this course. Because the University ‘anti-spam’ programs often reject email from Gmail, iCloud, Hotmail, Yahoo, and other public email addresses, there is no guarantee that I will receive your emails if you send them from a public email program – or from any off-campus server, when sending email using any method other than the university’s webmail system. That said, I will do my best to answer your emails promptly.

**Grade Adjustments**
Final grades in this course will be taken to the closest integer (i.e., I will “round off” decimals). Exam grades will be calculated out of 100% to one decimal place. I will not, under any circumstances, “bump up” your grade (i.e., to facilitate professional school applications etc.). This includes grades that end in a “9”. Along similar lines, I will not reweight examinations for reasons other than those outlined in section 5.3. In other words – I will not alter exam weights for evaluations that you have already written.

**Use of Recording Devices and Course Content**
Course instructors own and retain the intellectual property rights to their teaching materials. These rights extend to materials used in online settings and digital learning management systems like OWL. Additionally, some of the materials used within this course (e.g., the textbook) have license restrictions that limit the ways in which they may be shared and used outside the course. You do not have my permission to make audio or video recordings of lectures, take pictures of lecture material, or distribute any of the teaching materials within the course. **Unless explicitly noted otherwise, you may not edit, re-use, distribute, or re-broadcast any of the material posted to (or linked within) the course website.**
7.2 POLICY REGARDING ILLNESS
The University recognizes that a student’s ability to meet their academic responsibilities may, on occasion, be impaired by extenuating circumstances, including short-term illness or injury. Reasonable academic consideration is a cooperative process between the University, the student, and academic staff. All participants in the process must act in good faith, and fulfil their respective obligations, if it is to succeed.

Students who experience an extenuating circumstance (illness, injury, or other extenuating circumstance) sufficiently significant as to temporarily render them unable to meet academic requirements, may submit a request for academic consideration through the following routes:

• Submitting a Self-Reported Absence form, provided that the conditions for submission are met;
• For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner, in order to be eligible for Academic Consideration; or
• For non-medical absences, submitting appropriate documentation (e.g., obituary, police report, accident report, court order, etc.) to Academic Counselling in their Faculty of registration, in order to be eligible for academic consideration.

Students seeking academic consideration:
• Are advised to consider carefully the implications of postponing tests or midterm exams or delaying handing in work;
• Are encouraged to make appropriate decisions, based on their specific circumstances, recognizing that minor ailments (e.g., upset stomach) or upsets (e.g., argument with a friend) are not normally an appropriate basis for a self-reported absence;
• Must communicate with their instructors no later than 24 hours after the end of the period covered by either the self-reported absence or SMC, or immediately upon their return following a documented absence;
• Are advised that all necessary documentation, forms, etc. are to be submitted to academic counselling within two business days after the date specified for resuming responsibilities

Students who experience an unexpected illness or injury or an extenuating circumstance (48 hours or less) that is sufficiently severe as to temporarily render them unable to meet academic requirements (e.g., attending lectures or labs, writing tests or midterm exams, completing and submitting assignments, participating in presentations) should self-declare using the online Self-Reported Absence portal. This option should be used in situations where the student expects to resume academic responsibilities within 48 hours or less. The following conditions are in place for self-reporting of medical or extenuating circumstances:

a. Students will be allowed a maximum of two self-reported absences between September and April, and one self-reported absence between May and August;
b. The duration of the excused absence will be for a maximum of 48 hours from the time the Self-Reported Absence form is completed through the online portal, or from 8:30am the following morning if the form is submitted after 4:30pm;
c. The duration of the excused absence will terminate prior to the end of the 48 hour period, should the student undertake significant academic responsibilities (e.g., write a test, submit a paper) during that time;
d. The duration of an excused absence will terminate at 8:30am on the day following the last day of classes each semester, regardless of how many days of absence have elapsed;
e. Self-reported absences will not be allowed for scheduled final examinations; for midterm examinations scheduled during the December examination period; or for final lab examinations (i.e., “bellringers”);
f. Self-reporting may not be used for assessments (e.g., midterm exams, tests, reports, presentations, or essays) worth more than 30% of any given course;
g. Students must be in touch with their instructors no later than 24 hours after the end of the period covered by the Self-Reported Absence form, to clarify how they will be expected to fulfil the academic expectations they may have missed

7.3 POLICY ON CHEATING & ACADEMIC MISCONDUCT
Scholastic offences are taken seriously and you are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

7.4 HEALTH AND WELLNESS
As part of a successful undergraduate experience at Western, we encourage you to make your health and wellness a priority. Further information regarding health and wellness-related services available to students may be found at http://www.health.uwo.ca/. If you are in emotional or mental distress, please refer to Mental Health@Western (http://www.uwo.ca/uwocom/mentalhealth/) for a complete list of options about how to obtain help. To help you learn more about mental health, Western has developed an interactive mental health learning module, found here:
https://www.uwo.ca/health/staff_fac/mental_wellbeing/education/module.html

7.5 SUPPORT SERVICES
There are various support services around campus, and these include (but are not limited to):
- Student Development Centre -- http://www.sdc.uwo.ca/ssd/
- Student Health -- http://www.shs.uwo.ca/student/studenthealthservices.html
- Registrar’s Office -- http://www.registrar.uwo.ca/
- Ombudsperson’s Office -- http://www.uwo.ca/ombuds/
8.0 PROCEDURES FOR APPEALING ACADEMIC EVALUATIONS
In the first instance, all appeals of a grade must be made to the course instructor (informal consultation). If you are not satisfied with the decision of the course instructor, a written appeal must be sent to the Undergraduate Chair of the School of Health Studies. If you consider this response to be unsatisfactory, you may then appeal to the Associate Dean (Undergraduate) of the Faculty of Health Sciences. If this response is unsatisfactory, you may appeal to the Senate Review Board Academic. A Guide to Appeals is available from the Ombudsperson's Office.

The university-wide descriptor of the meaning of letter grades, as approved by Senate:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>90-100</td>
<td>One could scarcely expect better from a student at this level</td>
</tr>
<tr>
<td>A</td>
<td>80-89</td>
<td>Superior work that is clearly above average</td>
</tr>
<tr>
<td>B</td>
<td>70-79</td>
<td>Good work, meeting all requirements and eminently satisfactory</td>
</tr>
<tr>
<td>C</td>
<td>60-69</td>
<td>Competent work, meeting requirements</td>
</tr>
<tr>
<td>D</td>
<td>50-59</td>
<td>Fair work, minimally acceptable</td>
</tr>
<tr>
<td>F</td>
<td>below 50</td>
<td>Fail</td>
</tr>
</tbody>
</table>

It is expected that the grades for this course will fall between 72 and 76. In the event that the course average falls outside this range, a constant may be added to (or subtracted from) each student’s grade, by the instructor, to bring the class average in line with school policy.