

Western University

Faculty of Health Sciences

HS3801

Research Methods and Analysis in the Health Sciences

January 2023

1. COURSE INFORMATION

Course Number: HS3801B

Semester: Winter (Term 2) - 9-January – 14 April, 2023

Lecture Hours and Location:

<https://studentservices.uwo.ca/secure/timetables/mastertt/ttindex.cfm>

Session	Instructor/TA	Day	Start time	End time	Room
Practical/Lab	TA	Friday	9:30 AM	10:30 AM	AHB-1R40
Lecture	Instructor	Friday	10:30 AM	12:30 PM	AHB-1R40

Course Format: This course is structured in-person.

Course Weighting: 0.5

Enrolment limitations: Open to all students within the Faculty of Health Sciences. Students from other faculty's must obtain instructor permission.

Prerequisite(s): Health Sciences 2801 or the former Health Sciences 2800 or equivalents.

Antirequisite(s): Biology 2244A/B, Economics 2122A/B, Economics 2222A/B, Geography 2210A/B, MOS 2242A/B, Psychology 2810, Psychology 2820E, Psychology 2830A/B, Psychology 2850A/B, Psychology 2851A/B, Social Work 2207A/B, Sociology 2205A/B, Statistical Sciences 2035, Statistical Sciences 2141A/B, Statistical Sciences 2143A/B, Statistical Sciences 2244A/B, Statistical Sciences 2858A/B, Statistical Sciences 2037A/B if taken prior to Fall 2010, former Psychology 2885 (Brescia), former Statistical Sciences 2122A/B, former Social Work 2205.

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 if you are dropped from a course for failing to have the necessary prerequisites.

2. INSTRUCTOR INFORMATION:

Instructor	Ntonghanwah Forcheh(PhD)	nforcheh@uwo.ca
	Office: EC1458B	519-661-2111 x88789
Teaching Assistant	Julia Yvonne Yates	jyates23@uwo.ca

Office Hours: Friday 10:00Am – 3:00pm

Communication: Please communicate any questions in class or via email FIRST to the teaching assistants then to the course instructor if required. Please allow for 72 hours for a response.

Class Format: There is one 2-hour in-person lecture and one 1-hour lab per week. Lectures and the lab will be delivered in person. The lecture notes and any other relevant resources, data sets, recordings will be posted etc. will be posted to OWL.

3. COURSE DESCRIPTION

An introduction to measurement and analysis in health sciences research, covering descriptive statistics, one and two sample inference such as tests of means, proportions and correlation, linear regression and analysis of variance.

4. COURSE LEARNING OUTCOMES

By the end of this course, students, with the use of statistical package, be able to:

- a) Know scales of measurement of data and associated summary measures and graphical procedures for each scale
- b) Know concept of null and research/alternative hypotheses, type I, type II probabilities, power of a test meaning of rejecting the null hypothesis
- c) Obtain and interpret confidence intervals for the mean and test hypothesis about the mean using a single sample
- d) Know the assumptions about independent sample test, obtain the tests and check assumptions.
- e) Know difference between independent sample t-tests and paired t-tests.
- f) Obtain and interpret different measures of correlation and the assumptions and limitations of Pearson correlation coefficient.
- g) Know how to specify a regression line, obtain and test for significance of correlation coefficient and the relationship to the Pearson correlation coefficient
- h) Perform a chi-squared goodness of fit test for distribution a single variable and, test of association between two categorical variables.
- i) Perform one-way analysis of variance and perform multiple comparisons

5. COURSE SCHEDULE

Lecture Week	Date	Course Overview	Introduction Statistical packages used in course	Lectures (OpenStax)	Lab/Practicals (BlueText)
1	13-Jan-23	Describing Data	Descriptive statistics for nominal, ordinal and ratio scale variables - computation and interpretation	1.1, 2.1-2.8, 6.1-6.4	10.4, 7.2,7.4,7.9, 7.24
2	20-Jan-23	Hypothesis Testing	Concept of hypothesis tests - null and alternative hypothesis, one-sided and two sided tests	7.1-7.5, 8.1-8.6	10.1
3	27-Jan-23	Single Sample Inference	Single Sample Inference: Single sample from a normal distribution	9.1-9.6	10.7.14
4	03-Feb-23	Independent Groups t-test	Independent groups t-test: Two samples from independent normal distributions	10.1	10.7.13
5	10-Feb-23	Paired t-test	Paired t-test: Two paired/repeated samples from a single normal distribution	10.4	10.7.15
6	17-Feb-23	<i>Mid Term Exam - 9:00AM -12:50PM</i>			
	24-Feb-23	<i>No Lecture or Lab (reading week)</i>			
7	03-Mar-23	Correlation and scatter plots	Associations between quantitative variables: measures of linear and non-linear relationships	12.1-12.9	10.4
8	10-Mar-23	Simple Regression	Regression model, assumptions, parameters, goodness of fit and residuals	12.1-12.9	7.12, 7.21, 10.12, 12.9.1-12.9.3
9	17-Mar-23	Univariate Count Data inference	Chi-square goodnessof fit tests	11.1 to 11.8	10.13
10	24-Mar-23	Bivariate Count Data inference	Chi-Square Tests of association and Independence	11.1 to 11.8	10.3
11	31-Mar-23	ANOVA, Independent Groups	Comparing several means		10.7.2 -10.7.3, 7.20
12	07-Apr-23	ANOVA Multiple comparisons	Multiple comparisons tests		10.7.2 -10.7.3, 7.20

6. COURSE MATERIALS

There is no formal required textbook. However below are on-line recommended text for the lectures and practical/tutorials. Weekly lecture notes and videos shall be posted in OWL.

Recommended Reading Online texts

Lecture Notes

- There are numerous textbooks on basic statistical methods in the libraries as well as online and students are free to refer to any for further reading. The OpenStax text by Illowsky et al., has been recommended over the years for this course. The PDF of this text is available for free through **OpenStax.org**. <https://openstax.org/details/introductory-statistics>
- The relevant sections of the book are indicated under the column lecture notes (OpenStax) in the course outline. These provide only guide course coverage.

Lab and Practical guide

All data analysis and practical sessions shall be conducted using Bluesky Statistics Version 10.2.1. The following online text provides a easy to read guide to Blue Sky version 10.

BlueText: <https://r4stats.com/books/bluesky-statistics-user-guide/>

The relevant sections are indicated under Lab/Practical Column in the weekly course outline.

7. METHODS OF EVALUATION

Evaluation Components

Component	Description/coverage	Weighting (%)	Thursday from 8:00AM to 11:55pm of Weeks:
Tests	Online tests in OWL.	40	3,5,9, 11
Midterm	Exam that covers learning objectives for 1 st half of course	25	Friday 17-Feb-2023: 09:30am -12:30pm
Final Exam	cumulative exam that overs all learning objectives with greater coverage of second half of course	35	TBA

Software and hardware requirements for tests and examinations:

- You will need your laptop with relevant software used in lectures/lab sessions and be able to independent load data sets of different formats covered in labs/lectures.

There shall be four (4) tests held during weeks 3, 5, 9 and 11.

- You will be given an opportunity to complete 4 tests throughout this course. These tests will require you to apply concepts learned in class to independently perform data analysis using statistics software and answer online questions through tests/quiz in OWL. You may be required to include some of the variables and commands/menus used for the analysis. Each test must be completed in a single sitting and within the time allocated.
- The marks allocated for each question shall be indicated and the total marks for each test shall be out of 100.
- The range of questions shall include multiple choice, fill in the blanks and explaining results and concepts. Some questions shall require you to analysis data using Statistical Package to obtain required answers.
- You should allow 2 hours to take each test to allow you to download relevant data and loading them into the statistical package.

Mid-Term and Final Examinations

- The range of questions shall include multiple choice, fill in the blanks and explaining results and concepts. Some questions shall require you to analysis data using Statistical Package to obtain required answers.
- Each shall be of two hours duration, but you should be ready to start the examination at the indicated time as proctoring may be used.

The Mid term shall cover all learning outcomes for Weeks 1-5 of the course.

The Final Exam: The final exam will cover all learning the objectives for entire course.

Attendance and Classroom Behaviour

- The student is expected to attend all lectures and tutorials/practical sessions. Some practical sessions may only be discussed in lectures and others only during the lab session.
- You should use the lectures and tutorials hours as the first opportunity to ask for clarifications for any material that you have difficulties with. Students who miss classes, or parts of classes or tutorials are however, responsible for the material they have missed.

ADDITIONAL STATEMENTS

Remote Proctoring

Tests and examinations in this course may be conducted using a remote proctoring service if need arises. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide personal information (including some biometric data) and the session will be recorded. Proctoring requires you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at: <https://remoteproctoring.uwo.ca>

8. WESTERN UNIVERSITY POLICIES

University Policies:

Students are directed to read the Handbook of Academic and Scholarship Policy which includes Administrative Policies and Procedures regarding: Scholastic Discipline and Academic Sanctions; Policy and Procedures for the Conduct of Research; Copyrights, Patents; and Code of Behaviour for use of Computing Resources and Corporate Data. Some relevant policies of Information Technology Services and Appropriate Use of Computing and Network Facilities, Code of Ethical Behaviour, Software Ethics and Acceptable Use Policy.

The most up-to-date versions of all policies can be found on the University website

<https://www.uwo.ca/univsec/>

- a. Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition what constitutes a Scholastic Offence, at the following Web site:
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf
- b. Each student granted admission to Western must be proficient in spoken and written English. Students must demonstrate the ability to write clearly and correctly. Work presented in English in any subject at any level, which shows a lack of proficiency in English and is, therefore, unacceptable for academic credit, will either be failed or, at the discretion of the instructor, returned to the student for revision to a literate level.

- c. All required papers may be subject to submission for textual similarity review to the commercial plagiarism-detection software under the license to the University of the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to licensing agreement, currently between The University of Western Ontario and Turnitin.com
- d. Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review buy software that will check for unusual coincidences in answer patterns that may indicate cheating.

Health/Wellness Services:

Students who are in emotional/mental distress should refer to Mental Health@Western <http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.

Accessible Education Western (AEW):

Western is committed to achieving barrier-free accessibility for all its members, including graduate students. As part of this commitment, Western provides a variety of services devoted to promoting, advocating, and accommodating persons with disabilities in their respective graduate program.

Graduate students with disabilities (for example, chronic illnesses, mental health conditions, mobility impairments) are strongly encouraged to register with Accessible Education Western (AEW), a confidential service designed to support graduate and undergraduate students through their academic program. With the appropriate documentation, the student will work with both AEW and their graduate programs (normally their Graduate Chair and/or Course instructor) to ensure that appropriate academic accommodations to program requirements are arranged. These accommodations include individual counselling, alternative formatted literature, accessible campus transportation, learning strategy instruction, writing exams and assistive technology instruction.

Technology Requirements

You are responsible for all required course materials and announcements posted to the course's OWL website. Please ensure after the first class that when you log in you are able to access the course site. A copy of the course outline will be available on both OWL and the departmental website.

Support Services:

There are various support services around campus and these include, but are not limited to:

1. Student Development Centre -- <http://academicsupport.uwo.ca/>
2. Student Health -- <https://www.uwo.ca/health/>
3. Registrar's Office -- <http://www.registrar.uwo.ca/>
4. Ombudsperson Office -- <http://www.uwo.ca/ombuds/>

Health and Wellness:

The undergraduate experience is rewarding and challenging socially, emotionally, and intellectually. Finding ways to balance scholarly life with our personal lives can be tough, but it's important to learn how to manage stress. Western provides several health and wellness-related services to students, which may be found at <http://www.health.uwo.ca/>.

You can also check out the Campus Recreation Centre or the McIntosh Gallery (<http://www.mcintoshgallery.ca/>), for alternative spaces to reconnect with your bodies and restore your spirit. You may also want to access local resources that are closer to where you are living during the school year. Recalibrating ourselves emotionally begins with slowing down, reminding ourselves that we are ok, and taking a few deep, slow breaths. This remarkably effective strategy brings the body from stress mode into a more relaxed state.

If you are in emotional or mental distress should refer to Mental Health@Western [Mental Health Support - Health & Wellness - Western University \(uwo.ca\)](mailto:MentalHealthSupport@uwo.ca) 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: [Health & Wellness - Western University \(uwo.ca\)](http://www.uwo.ca/healthwellness). It's also advisable to have a wellness safety plan if you don't want to reach out to formal services. Having the numbers of a few trusted individuals is another strategy.

Grade policy:

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

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

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