

## Department of Epidemiology and Biostatistics

### Biostatistics 9641U

Missing Data

June-July 2021

**Time:** Tuesday and Thursday 10:00-12:00

**Location:** Online Delivery via Zoom (real-time)

**Lab Time:** N/A

**Instructor:** Guangyong Zou

**Office Hours:** N/A

**E-mail:**

gy.zou@robartsinc.com

### Course Information

Unless you have either the requisites for this course or written special permission from the Graduate Chair 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.

### Course Description

Study participants often do not provide all requested data, resulting in missing data. Most analytic procedures in statistical software quietly delete participants with missing values. However, missing data are a potential source of bias, and their handling in the statistical analysis can have an important impact on the likelihood and extent of bias. Inadequate handling of missing data may also result in invalid p-values and confidence intervals. This course introduces principled approaches to dealing with missing data arising from randomized controlled trials and observational studies. Students will have opportunity in analyzing studies with missing data using Stata (<https://www.stata.com/order/new/edu/gradplans/student-pricing/>).

### Course Syllabus

Tentative

Week	Date	Topic
1	Jun 1	Introduction
	Jun 3	Complete Case Analysis, Full-Information Maximum Likelihood and Inverse Probability Weighting
2	Jun 8	Introduction to Multiple Imputation

	Jun 10	Theory of Multiple Imputation & Rubin's Rule
3	Jun 15 Jun 17	Multiple Imputation using Chained Equations
4	Jun 22 Jun 24	Analysis of Observational Studies Analysis of Clinical Trials
	Jul 15	<b>Project Due</b>

**Prerequisite:** Biostatistics 9521B

**Required Software: Stata**

• Stata/IC, 6 month licence (\$48 US):

<https://www.stata.com/order/new/edu/gradplans/student-pricing/>

**Recommended Course Materials**

1. Carpenter JR and Kenward MG (2013) Multiple Imputation and its Application. Wiley.
2. Stata Multiple Imputation Reference Manual Release 16.  
<https://www.stata.com/manuals/mi.pdf>

**Methods of Evaluation**

- 20% - Attendance & Participation
- 80% - Final project (Due on 5:00pm July 16)

Note that to pass the course, students must obtain an overall mark of 75%.

**Policy on Accommodation for Medical and Non-Medical Absences**

All non-medical absences must be approved in advance. In the case of an unexpected absence on compassionate grounds, documentation may be requested. If documentation is required for either medical or non-medical academic accommodation, then such documentation must be submitted by the student to the instructor.

**Statement on Academic Offences**

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_grad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_grad.pdf)

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for 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 the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

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.

## **Support Services**

As part of a successful student experience at Western, we encourage students to make their health and wellness a priority. Western provides several on campus health-related services to help you achieve optimum health and engage in healthy living while pursuing your degree. For example, to support physical activity, all students, as part of their registration, receive membership in Western's Campus Recreation Centre. Numerous cultural events are offered throughout the year. Please check out the Faculty of Music web page <http://www.music.uwo.ca/>, and our own McIntosh Gallery <http://www.mcintoshgallery.ca/>. Information regarding health- and wellness-related services available to students may be found at <http://www.health.uwo.ca/>

Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (graduate or undergraduate chair), or other relevant administrators in their unit. Information regarding health- and wellness-related services available to students may be found at <http://www.health.uwo.ca/>.

Registrarial Services: <http://www.registrar.uwo.ca>

USC Student Support Services: <http://westernusc.ca/services/>

Student Development Centre: <http://www.sdc.uwo.ca/>

SGPS Life & Community web page: [https://grad.uwo.ca/life\\_community/self/index.html/](https://grad.uwo.ca/life_community/self/index.html/)

Students seeking help regarding mental health concerns are advised to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their program director (graduate or undergraduate chair), or other relevant administrators in their unit. 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.

## **Student Accessibility Services**

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 encouraged to register with Student Accessibility

Services, a confidential service designed to support graduate and undergraduate students through their academic program. With the appropriate documentation, the student will work with both SAS 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.

## **Department & Faculty Offices**

The Epidemiology & Biostatistics main office is located in K201 in the Kresge Building on Main campus.

## **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.

## **Statement on Copyright and Audio/Video Recording**

All of the remote learning sessions for this course will be recorded. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals participating in the course for their private or group study purposes. Please contact the instructor if you have any concerns related to session recordings.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor. You must always ask permission to record another individual and you should never share or distribute recordings.

Course material produced by faculty is copyrighted and to reproduce this material for any purposes other than your own educational use contravenes Canadian Copyright Laws.

## **Cell Phone and Electronic Device Policy**

The Schulich School of Medicine & Dentistry is committed to ensuring that testing and evaluation are undertaken fairly across all our departments and programs. For all tests and exams, it is the policy of the School and the Department of Epidemiology and Biostatistics that any electronic devices, i.e., cell phones, tablets, cameras, or iPod are strictly prohibited. These devices **MUST** be left either at home or with the student's bag/jacket at the front of the room and **MUST NOT** be at the test/exam desk or in the individual's pocket. Any student found with one of these prohibited devices will receive a grade of zero on the test or exam. Non-programmable calculators are only allowed when indicated by the instructor. The Department of Epidemiology and Biostatistics is not responsible for stolen/lost or broken devices.