

Department of Epidemiology and Biostatistics

Biostatistics 3110B

Multivariable Methods in Biostatistics Winter 2023

Lecture:

Tue, 11:30am-12:30pm, MSB 193AB
Thu, 11:30am-12:30pm, MSB 193AB

Lab:

Thu, 12:30pm-1:30pm, MSB 193AB

Instructor: Osvaldo Espin-Garcia

Office Hours:

Tue, 1:30pm-2:30pm PHFM 3125
Thu, 2:00pm-3:00pm PHFM 3125

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Phone: x81358

TA: Emma Smith

Office Hours: By appointment

E-mail: esmit56@uwo.ca

Note: Please include the course code BIO3110B2023 in the subject line of all emails.

Course Description

This course is designed to provide students with a conceptual understanding of multivariable regression models most often encountered by epidemiologists and biostatisticians. These include multiple linear regression models for continuous outcomes, logistic regression models for binary outcomes, and Cox proportional hazard regression models for time-to-event outcomes. Models will be discussed in the contexts of isolating the effect of a single predictor, understanding multiple predictors, and outcome predictions. Generalized linear models and statistical methods for longitudinal studies are also covered. Data analysis in the course will be conducted primarily using R and/or SAS.

Course Information

Prerequisites

Biostatistics 3100A, Epidemiology 3200A or equivalent

Policy: 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.

Course Learning Outcomes/Objectives

Upon successful completion of this course, students will be able to:

- (i) understand and critique applications of regression models appearing in epidemiological and biomedical literature;
- (ii) understand the quantitative aspects of designs commonly seen in epidemiological and biomedical research;
- (iii) carry out analyses of epidemiological and biomedical studies using common statistical packages;
- (iv) interpret statistical analysis results; and
- (v) communicate statistical results effectively.

Course Materials

Required: Vittinghoff, Glidden, Shiboski, McCulloch (2012) *Regression Methods in Biostatistics: Linear, Logistic, Survival, and Repeated Measures Models* (2nd ed). Springer. *PDF is available through Western library.*

Additional materials will be provided on the course's OWL website.

Recommended:

- Braun, W. J., & Murdoch, D. J. (2007). *A first course in statistical programming with R*. Cambridge University Press.
- Kleinman, K., & Horton, N. J. (2014). *SAS and R: Data management, statistical analysis, and graphics* (2. ed). Boca Raton, FL: Chapman Hall/CRC.

Methods of Evaluation

- 40% - Bi-weekly assignments (Best 5 out of 6)
- 10% - Lab assignments (Best 10 out of 11)
- 25% - Mid-term exam
- 25% - Final exam

Notes:

1. Late assignments without a valid documented reason (medical or bereavement) will lose 20% of the earned grade per day. For example, if an assignment is due at 11:59pm, and is submitted at 12:00am, then it will lose 20% of the earned grade. If it is submitted at 12:00 of the following day, then it will lose 40% of the earned grade, and so on.

2. For mid-term examination, non-programmable calculators and one (1) page double-sided letter notes are allowed. Devices with internet access are not allowed.

3. For final exam, non-programmable calculators and two (2) pages double-sided letter notes are allowed. However, computer and internet access are not allowed.

Course Timeline and Format

The format of this course is in person.

Week	Date	Topic	Text Chapter *
1	1.10 1.12	<ul style="list-style-type: none"> • Introduction • Exploratory and Descriptive Methods 	1 2
		Lab 1	
2	1.17 1.19	<ul style="list-style-type: none"> • Exploratory and Descriptive Methods • Basic Statistical Methods 	2 3
		Lab 2, assignment 1	
3	1.24 1.26	<ul style="list-style-type: none"> • Basic Statistical Methods • Linear Regression 	3 4
		Lab 3	
4	1.31 2.2	<ul style="list-style-type: none"> • Linear Regression • Linear Regression 	4
		Lab 4, assignment 2	
5	2.7 2.9	<ul style="list-style-type: none"> • Linear Regression • Linear Regression 	4
		Lab 5	
6	2.14 2.16	<ul style="list-style-type: none"> • Logistic Regression • Mid-term examination (11:30am-1:30pm) 	5 1-4
		No lab, assignment 3	
Reading week			
7	2.28 3.2	<ul style="list-style-type: none"> • Logistic Regression • Logistic Regression 	5
		Lab 6	
8	3.7 3.9	<ul style="list-style-type: none"> • Logistic Regression • Logistic Regression 	5
		Lab 7, assignment 4	
9	3.14 3.16	<ul style="list-style-type: none"> • Generalized Linear Models • Generalized Linear Models 	8
		Lab 8	
10	3.21 3.23	<ul style="list-style-type: none"> • Survival Analysis • Survival Analysis 	6
		Lab 9, assignment 5	
11	3.28 3.30	<ul style="list-style-type: none"> • Survival Analysis • Survival Analysis 	6
		Lab 10	
12	4.4 4.6	<ul style="list-style-type: none"> • Repeated Measures and Longitudinal Data • Repeated Measures and Longitudinal Data 	7
		Lab 11, assignment 6	
Final exam	TBD		1-8

*Chapter numbers are referred to Vittinghoff et al. (2012).

Western Academic Policies and Statements

Absence from Course Commitments

A. Absence for medical illness:

Students must familiarize themselves with the [Accommodation for Illness Policy](#).

A student seeking academic accommodation for any **work worth less than 10%** must contact the instructor or follow the appropriate Department or course specific instructions provided on the course outline. Instructors will use good judgment and ensure fair treatment for all students when considering these requests. You are not required to disclose details about your situation to your instructor; documentation is not required in this situation, and you should not send any pictures to your instructor.

If you are unable to meet a course requirement for any **work worth 10% or greater** due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Academic Counseling as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. Please note that the format of a make-up test, exam, or assignment is at the discretion of the course coordinator.

A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Record's Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found at: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

B. Absence for non-medical reasons:

Student absences might also be approved for non-medical reasons such as religious holidays and compassionate situations. Please review the policy on [Accommodation for Religious Holidays](#). All non-medical requests must be processed by Academic Counselling. Not all absences will be approved; pay attention to the academic calendar and final exam period when booking any trips.

C. Special Examinations

A Special Examination is any examination other than the regular examination, and it may be offered only with the permission of the Dean of the Faculty in which the student is registered, in consultation with the instructor and Department Chair. Permission to write a Special Examination may be given on the basis of compassionate or medical grounds with appropriate supporting documents. To provide an opportunity for students to recover from the circumstances resulting in a Special Examination, the University has implemented Special Examinations dates. These dates as well as other important information about examinations and academic standing can be found [here](#).

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, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.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.

Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Accessible Education (AE) at 661-2111 x 82147 for any specific question regarding an accommodation or review the [Policy on Accommodation for Students with Disabilities](#)

Copyright and Audio/Video Recording Statement

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. You must always ask permission to record another individual and you should never share or distribute recordings.

Support Services

The following links provide information about support services at Western University:

[Academic Counselling \(Science and Basic Medical Sciences\)](#)

[Appeal Procedures](#)

[Registrarial Services](#)

[Student Development Services](#)

[Student Health Services](#)

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Department & Faculty Offices

The Department of Epidemiology and Biostatistics is located on the third floor of the Western Centre for Public Health & Family Medicine (PHFM) on Western University's Main Campus.

Undergraduate Students requiring academic counselling should contact the Science & Basic Medical Sciences Academic Counselling Office: <https://www.uwo.ca/sci/counselling/>.

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.

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.