



POPM*6210 Epidemiology II

Winter 2023

Section(s): C01

Department of Population Medicine

Credit Weight: 0.50

Version 1.00 - December 15, 2022

1 Course Details

1.1 Calendar Description

Advanced study design and analytic methods for the analysis of data from observational studies and surveys.

1.2 Course Description

This course is complementary to Epidemiology I (POPM*6200). The overall objectives of the course are to help students develop skills in observational study design, data analysis, and statistical model building as it relates to observational epidemiological studies. Emphasis will be placed on using, understanding, and making inferences about associations/effects based on least squares, logistic, Poisson, and other multivariable regression analyses. In particular, the integration of causal thinking with statistical modeling will be a recurring theme throughout this course.

1.3 Timetable

Timetable is subject to change. Please see WebAdvisor for the latest information.

Date	Lecture No.	Session Topic
Tuesday January 10	1	Introduction to course, technology issues, causal concepts (Chapter 1)
Thursday January 12	2	Observational study designs & review measures of association (Chapters 6-10)
Tuesday	3	Observational study designs & review measures of association

January 17		(Chapters 6-10) Sample size considerations (Chapter 2)
Thursday January 19	4	Selection bias: control and prevention (Chapter 12)
Tuesday January 24	5a	Information bias: impact and prevention (Chapter 12)
Tuesday January 24	5b	STATA lab and other exercises (2:30-4:30 pm) Students: A through H (last names)
Thursday January 26	6	Structural causal models & extraneous variables: understanding confounding and interaction (Chapter 13)
Tuesday January 31	7a	Linear regression: basic theory and interpretation (Chapter 14)
Tuesday January 31	7b	STATA lab and other exercises (2:30-4:30 pm) Students: I through Z (last names)
Thursday February 2	8	Linear regression: coding of continuous and categorical independent variables, partial F-test, and assessing the linearity of continuous variables (Chapter 14)
Tuesday February 7	9	Linear regression: re-scaling, interaction, collinearity, and centering (Chapter 14)
Thursday February 9	10	Linear regression: predicted values, assessing overall fit, residuals, and transformations of Y-variables (Chapter 14)
Tuesday February 14	11	Linear regression: outliers, leverage, and influential observations (Chapter 14) Approaches to model building (Chapter 15)

Thursday February 16	12	Approaches to model building cont. (Chapter 15) Logistic regression: basic theory, maximum likelihood estimation, assumptions, and interpretation of coefficients (Chapter 16)
February 20-26		Winter Break
Tuesday February 28	13	Midterm examination 1:00-3:00 pm covering lectures 1-11
Thursday March 2	14	Logistic regression: interpreting intercepts, interaction and confounding, goodness-of-fit (GOF), and predictive ability of models (Chapter 16)
Tuesday March 7	15	Logistic regression: evaluating residuals, over-dispersion, and information measures for non-nested models (Chapter 16) Linear regression project assigned
Thursday March 9	16	Logistic regression: model building strategies, population attributable fraction, and conditional logistic regression (Chapter 16)
Tuesday March 14	17	Introducing exact logistic regression and multinomial regression (Chapter 17)
Thursday March 16	18	Poisson regression: modeling count and rate data, evaluating GOF and residuals (Chapter 18)
Tuesday March 21	19	Poisson regression: over-dispersion, negative binomial models & zero-inflated models (Chapter 18) Logistic regression project assigned
Thursday March 23	20	Clustered data: introduction to clustered data and “crude” analytical techniques for correcting for over-dispersion (post-hoc methods, robust standard errors, fixed-effects) (Chapters 20-23)

Friday March 24		Linear regression project due at 5 pm
Tuesday March 28	21	Clustered data: introduction to generalized estimating equations and mixed-models (Chapters 20-23)
Thursday March 30	22	Clustered data: advanced concepts in mixed-modeling (Chapters 20-24)
Tuesday April 4	23	Ecological and group level studies (Chapter 29)
Thursday April 6	24	Final exam review
Thursday April 6		Logistic regression project due at 5 pm
TBD		Final examination

All lectures and labs will be delivered live (rooms to be determined) or on-line synchronously depending on room availability and public health restrictions.

1.4 Final Exam

Exam time and location to be determined. Please see WebAdvisor for the latest information.

2 Instructional Support

Course Coordinator & Instructor:

Dr. David Pearl (dpearl@uoguelph.ca), Room 207B, Clinical Research Building, ext. 54748

Teaching Assistants:

Keana Shahin (kshahinm@uoguelph.ca)

Paula Olivares Guzman (polivare@uoguelph.ca)

3 Learning Resources

Required Textbook:

Veterinary Epidemiologic Research (2nd Edition) by Ian Dohoo, Wayne Martin, and Henrik Stryhn. AVC Inc., 2009.

or

Methods in Epidemiologic Research by Ian Dohoo, Wayne Martin, and Henrik Stryhn. AVC Inc., 2012.

These textbooks can be downloaded at <http://www.upei.ca/ver> and <http://www.upei.ca/mer>.

Other Textbooks on Reserve:

Modern Epidemiology (2nd Edition) by Kenneth Rothman, and Sander Greenland, Lippincott Williams & Wilkins, 1998.

Veterinary Epidemiology by Wayne Martin, Alan Meek, and Preben Willeberg, Iowa University Press, 1987.

Veterinary Epidemiology (3rd Edition) by Michael Thrusfield, Blackwell Publishing, 2005.

PDQ Epidemiology (2nd Edition) by Geoffrey Norman and David Streiner, B.C. Decker, 1998.

Accessing software for Epi II:

All course software including Stata 16 can be accessed remotely at <https://rdweb.wvd.microsoft.com/arm/webclient/index.html>. Please note that you will be instructed to provide your University log-in information and will enter the "Cloud" interface via the OVC Grads pathway.

Please note that you can order your own personal copy of STATA 17 on-line and purchase an annual or perpetual license (<https://www.stata.com/order/new/edu/profplus/student-pricing/>)

4 Learning Outcomes

4.1 Course Learning Outcomes

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

1. Design and identify different types of observational studies including cross-sectional, case-control, cohort, and various hybrid study designs.
 2. Understand the role of study design in preventing systematic bias, identify different types of systematic biases (i.e., confounding bias, selection bias, information bias, and ecological bias), and predict the direction of potential biases given certain research scenarios.
 3. Apply causal reasoning to the development of statistical models using causal diagrams and concepts concerning extraneous variables.
 4. Using epidemiological data, fit and interpret statistical models using linear, logistic, multinomial, Poisson, negative binomial, zero-inflated, and hurdle models, and assess model assumptions and conduct appropriate model diagnostics.
 5. Understand the impact of clustering on statistical models, apply various techniques to correct for its effects (including robust standard errors, fitting models using generalized estimating equations, and fitting multi-level models), and understand the benefits and limitations of these statistical approaches.
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5 Teaching and Learning Activities

Class Organization:

The class will meet for 1.5 hours on Tuesday and Thursday each week from 1:00-2:30pm. Traditional lectures will begin most topics, but students will be expected to participate in group discussions concerning analytical and reading assignments. Readings from the required textbook and journal articles will often be assigned at the end of class, and students will be expected to have read the articles and be prepared to discuss them during the following class. During lectures, students will also be introduced to a variety of software packages used for epidemiological research, especially STATA. All of these packages will be available remotely through the internet. Students will be expected to use these software packages for assignments and examinations. Assignments with answer keys will be provided regularly throughout the course. Students are expected to complete and review these assignments on their own. However, there will be time to review assignments with the

instructor and/or T.A. on Tuesdays from 2:30-4:30pm. All lecture overheads and other materials will be stored on the course's CourseLink site (<https://courselink.uoguelph.ca/shared/login/login.html>). See detailed schedule in the Timetable.

6 Assessments

6.1 Marking Schemes & Distributions

Evaluation:

2-hour midterm exam (25%)

3-hour final exam (45%)

Linear regression project (15%)

Logistic regression project (15%)

7 University Statements

7.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

7.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions

<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

7.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

7.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

7.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website

<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website

<https://www.ridgetownc.com/services/accessibilityservices.cfm>

7.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic

integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

7.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

7.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>

7.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

7.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

7.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.
