UNIVERSITY of GUELPH

POPM*6210 Epidemiology II

Winter 2020
Section(s): C01

Department of Population Medicine
Credit Weight: 0.50
Version 1.00 - December 18, 2019

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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 statistical 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 7, PAHL 1810	1	Introduction to course, technology issues, causal concepts (Chapter 1)
Thursday January 9, PAHL 1810	2	Observational study designs & review measures of association (Chapters 6-10)

Tuesday January 14, PAHL 1810	3	Observational study designs & review measures of association (Chapters 6-10) Sample size considerations (Chapter 2)
Thursday January 16, PAHL 1810	4	Selection bias: control and prevention (Chapter 12)
Tuesday January 21, PAHL 1810	5	Information bias: impact and prevention (Chapter 12)
Tuesday January 21, 2500 Stewart Building	**5b**	**STATA lab and other exercises (2:30-4:30 pm)** **Students: A through H (last names)**
Thursday January 23, PAHL 1810	6	Structural causal models & extraneous variables: understanding confounding and interaction (Chapter 13)
Tuesday January 28, PAHL 1810	7a	Linear regression: basic theory and interpretation (Chapter 14)
Tuesday January 28, 2500 Stewart Building	**7b**	**STATA lab and other exercises (2:30-4:30 pm)** **Students: I through Z (last names)**
Thursday January 30, PAHL 1810	8	Linear regression: coding of continuous and categorical independent variables, partial F-test, and assessing the linearity of continuous variables (Chapter 14)
Tuesday February 4,	9	Linear regression: re-scaling, interaction, collinearity, and centering (Chapter 14)

PAHL 1810		
Thursday February 6, PAHL 1810	10	Linear regression: predicted values, assessing overall fit, residuals, and transformations of Y-variables (Chapter 14)
Tuesday February 11, PAHL 1810	11	Linear regression: outliers, leverage, and influential observations (Chapter 14) Approaches to model building (Chapter 15)
Thursday February 13, PAHL 1810	12	Approaches to model building cont. (Chapter 15) Logistic regression: basic theory, maximum likelihood estimation, assumptions, and interpretation of coefficients (Chapter 16)
February 17-21		**Winter Break**
Tuesday February 25, 2500 Stewart Building	**13**	**Midterm Examination 1:00-3:00 pm (time to be confirmed) in the computer laboratory covering lectures 1-11**
Thursday February 27, PAHL 1810	14	Logistic regression: interpreting intercepts, interaction and confounding, goodness-of-fit (GOF), and predictive ability of models (Chapter 16)
Tuesday March 3, PAHL 1810	**15**	Logistic regression: evaluating residuals, over-dispersion, and information measures for non-nested models (Chapter 16) **Linear regression project assigned**

Thursday March 5, PAHL 1810	16	Logistic regression: model building strategies, population attributable fraction, and conditional logistic regression (Chapter 16)
Tuesday March 10, PAHL 1810	17	Introducing exact logistic regression and multinomial regression (Chapter 17)
Thursday March 12, PAHL 1810	18	Poisson regression: modeling count and rate data, evaluating GOF and residuals (Chapter 18)
Tuesday March 17, PAHL 1810	**19**	Poisson regression: over-dispersion, negative binomial models & zero-inflated models (Chapter 18) **Logistic regression project assigned**
Thursday March 19, PAHL 1810	**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) **Linear regression assignment due**
Tuesday March 24, PAHL 1810	21	Clustered data: introduction to generalized estimating equations and mixed-models (Chapters 20-23)
Thursday March 26, PAHL 1810	22	Clustered data: advanced concepts in mixed-modeling (Chapters 20-24)
Tuesday March 31, PAHL 1810	23	Ecological and group level studies (Chapter 29)
Thursday April 2, PAHL 1810	24	Final exam review

Friday April 3		**Logistic regression assignment due**
Thursday April 16, 2500 Stewart Building	☒	**Final examination 1:00-4:00 pm in the computer laboratory (time and date to be confirmed)**

PAHL – Pathobiology building

1.4 Final Exam

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

April 16, 1-4 pm, Room 2500

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2 Instructional Support

Course Coordinator & Instructor:

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

Teaching Assistants:

Jolene Giacinti (jgiacint@uoguelph.ca), Room 3820, Pathobiology Building, ext. 54662, or Room 107B, Clinical Research Building, ext. 54728

Mohammad Howard-Azzeh (mhowarda@uoguelph.ca), Room 107B, Clinical Research Building, ext. 54728

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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 purchased on line at
http://www.upei.ca/ver, http://www.upei.ca/mer, or in the bookstore.

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 the OVC Network and Software for Epi II:

1. If you are registered in the class and an OVC student, you do not have to do any additional work to access the OVC network.

2. If you are a registered student, but not an OVC student follow these instructions from **OVC ITS**:

> Before attempting to use a computer in OVC, go to web page https://www.uoguelph.ca/ccs/apps/password/change/ and change your (e-mail) password. This changes your OVC password at the same time.

> If you do not actually want to change your e-mail password at this time, then just re-enter the old one. This can be done from any computer, but if you forget to do so before arriving at OVC, you will need to ask someone to log in for you and do the above before you can use OVC computers.

> The computers in the OVC Learning Commons have a special "lib" login, which can be used to visit this web page as well.

> 3. If you are not an OVC student and you have not yet registered for the course, please send OVC ITS your e-mail address, full name, and student number to arrange for access to the OVC network.

4. Once you are on the system, you may access STATA by using the following pathway from the start menu: Start/Tile menu > Stata 15 (folder) > StataIC 15 (64-bit)

5. You can access PDFs of lectures and other course files from the course's CourseLink site (https://courselink.uoguelph.ca/shared/login/login.html).

6. Please note that you can order your own personal copy of STATA 16 on-line and purchase an annual or perpetual license (https://www.stata.com/order/new/edu/gradplans/campus-gradplan/)

7. If you wish to access STATA or the V:drive remotely, please contact OVC ITS staff for assistance.

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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 asses 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 through the OVC Network and/or 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 in the computer lab in room 2500 of the Stewart Building. 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.

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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%)

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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 book their exams at least 7 days in advance and not later than the 40th Class Day.

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

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