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EPIB685 / README.md



hiroshimamiya Update README.md

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# EPIB685: Principles of Environmental Health Sciences II

## Preamble

### Student wellness

One out of three students in Canada experience some form of mental health issues during their academic journey. If you find yourself facing a mental health challenge or need to talk to someone, please find on- and off-campus resources and support below:

- Wellness Hub: <https://pgss.mcgill.ca/en/mental-health-resources>
- Specific needs for International students: <https://www.mcgill.ca/internationalstudents/>
- See "Community Resources" for 24/7/365 support: <https://ssmu.ca/resources/mental-health/>
- Information about available resources in the Faculty of Medicine and Health Sciences maybe obtained from the Local Wellness Advisors: <https://www.mcgill.ca/wellness-hub/local-wellness-advisor-medicine-health-sciences-graduate-students>

## Land acknowledgment

McGill University is located on the unceded territory of the Kanien'keha:ka, which has long served as a site of meeting and exchange amongst Indigenous peoples, including the Haudenosaunee and Anishinabeg nations. McGill honors, recognizes, and respects these nations as the traditional stewards of the lands and waters on which we meet today

# Course information

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**Restriction(s):** Open to graduate students in the Environmental Health Sciences or permission of the course instructors. Not open to students who have taken or are taking EXMD 671 or NRSC 671 or PHAR 671.

## Prerequisites

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Permission of the instructor. Basic understanding in biostatistics and epidemiologic study design is helpful, but not required.

## Course description

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This course is intended to build the foundational knowledge in epidemiologic approaches to investigate the population distribution and etiologic association of environmental risk factors on health, with a focus on research design and critical appraisal.

Methods of instruction will feature lectures, student-led presentations, and an interactive lab session. The focus will be on the understanding and critical appraisal of modern epidemiological research.

## Learning Objectives

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The primary outcome is to appreciate and interpret environmental epidemiological study designs and research methods. By the end of the course, students should be able to read a published paper in environmental epidemiology and to appreciate the methods and interpret the findings from a population health perspective.

Specific learning objectives are:

- To understand the design and interpretation of the main study designs in environmental epidemiology: cohort, case-control, and cross-sectional studies.
- To understand threats to the validity of population health research: bias and confounding

- To construct an appropriate epidemiologic research question and devise an appropriate study design using available data.
- To understand essential concepts in quantitative reasoning, causal inference and measurement error.
- To Effectively communicate research design and findings, both orally and in writing.
- To gain hands-on skills to map the geospatial distribution of environmental risk factors.
- Time permitting, a sample of advanced research methods will be covered, including exposure mixture analysis, geospatial analysis and Bayesian disease mapping, and Global Positioning Systems (GPS).

## Course time and location

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Friday 9:35AM-12:35PM EST, interrupted by a 10-15 minutes break. All teaching is in-person (subject to COVID-related regulations), and lectures will be recorded by Zoom.

2001 McGill College, 11th Floor, Rm 1140

## Office ours

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After the class or by appointment. Please email the instructor or TA.

## Reading materials and lectures

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Lecture slides will be available in MyCourses. There is no one text for this course – lectures benefit articles provided in the class.

### Supplementary readings

Students wishing to pursue employment as an epidemiologist and/or conduct environmental epidemiological research may wish to obtain the following resources from course reserve or purchase:

*Environmental Epidemiology: Principles and Methods*, RM Merrill (Jones & Bartlett Learning, 2008); *Exposure assessment in occupational and environmental epidemiology*, M Nieuwenhuijsen et al. (Oxford University Press, 2015); *A biological approach to environmental assessment and epidemiology*, TJ Smith and D Kriebel (Oxford University Press, 2010); and, *EPA - Guidelines for Exposure Assessment*.

Other books also on the class web page including *A pocket guide to epidemiology*; *Glossary of Epidemiological Terms*; *Dictionary of environmental health*

## Software

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Please download and install qGIS software by the beginning of the second class. We will need this tool for Assignment 1. <https://www.qgis.org/en/site/forusers/download.html>

## Class Schedule

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Classes consist of lectures and instruction for assignments and student-led presentations with a break.

| Week | Date        | Lecture  | In-class assignment work  |
|------|-------------|--|---|
| 1    | January 5   | Course overview and introduction to environmental epidemiology |   |
| 2    | January 12  | Study Design 1: cohort study I                                 | Introduction to Geographic Information Systems                                    |
| 3    | January 19  | Study Design 1: Cohort study II                                | hands-on work for Geographic Information Systems and instruction for Assignment 1 |
| 4    | January 26  | Study design 2: Case-control study                             | Q and A session for Assignment 1  |
| 5    | February 2  | Ecological and Cross-sectional study                           | Pick paper to review (Assignment 2) AND the review of Assignment 1                |
| 6    | February 9  | Statistical analysis in environmental epidemiology             | Introduction to project (Assignment 3)  |
| 7    | February 16 | Measurement Error  |   |
| 8    | February 23 | Causal inference 1   | Q and A for project proposal  |

| Week | Date     | Lecture                              | In-class assignment work  |
|------|----------|--------------------------------------|---|
| 9    | March 1  | Causal inference 2                   | 3-minutes presentation of preliminary project proposal (Assignment 3) |
| NA   | March 8  | NO CLASS (Winter break)              |   |
| 10   | March 15 | Time-series and case-crossover study | Presentation of paper review (Assignment 2)                           |
| 11   | March 22 | Extra topics, if time permits        | Presentation of paper review (Assignment 2)                           |
| NA   | March 29 | NO CLASS (Good Friday)               |   |
| 12   | April 5  |                                      | Presentation of projects (Assignment 3)                               |
| 13   | April 12 |                                      | Presentation of projects (Assignment 3)                               |

- Extra topics include an introduction to mixture analysis or Bayesian disease mapping

## Grading Scheme

| Assignment   | Grade | Deadline                       |
|--|-------|--------------------------------|
| Assignment 1: Submission of an exposure map  | 5%    | January 30th                   |
| Assignment 2a: In-class presentation of critical review (nothing to submit)  | 20%   | Class 10 and 11                |
| Assignment 2b: Submission of written critical review   | 25%   | March 29, Before Good Friday   |
| Assignment 3a: Project presentation - All groups should submit their presentation slides before April 1st so that other groups can prepare for peer review | 15%   | Class 12 and 13                |
| Assignment 3b: Written constructive review of other teams' projects  | 15%   | April 16                       |
| Assignment 3c: Written project   | 20%   | Very end of April or early May |

| Assignment | Grade | Deadline |
|------------|-------|----------|
|            |       | (TBA)    |
| Total      | 100%  |          |

## Evaluation Components and Student Tasks

### Assignment 1: Mapping exposures to urban exposome in Montreal using GIS software (individual work)

You will geographically map urban exposures and social determinants of health in Montreal using GIS (Geographic Information System). The objective is to be familiar with GIS software and geospatial data. In Class (Week) 2 and 3, we will go through the use of GIS software using example data to prepare for the assignment.

### Assignment 2 a and b: Critical review of environmental epidemiology study (group work)

With your teammate (2-3 groups of students, depending on class size), you will be asked to provide a presentation and written review for an environmental epidemiology study. The research papers to critique will be assigned to students in Week 5.

The main objective is to provide you with practice in evaluating the scientific quality of papers from the literature and will thus assist in consolidating and integrating the material taught in the course. This will also assist with the planning of the project (Assignment 3).

Generative AI (e.g., ChatGPT) can be used to assist in writing, if you make appropriate acknowledgment and provide specific use of these tools (including written prompts) in the report and oral presentation. This is to inform other students the effective use of these tools in writing a report. See the specific policy regarding the use of AI technologies below.

**Length:** The critique should be about 2 pages (suggested, excluding references) with single space and can be written out using bullets if you prefer, ensuring that the flow is logical.

#### Format:

- About 20 min of presentation (2a), followed by 5 minutes of questions. the presentation may be shorter in duration, depending on class size.
- About 2 pages (suggested, can be longer, excluding references) with single space and can be written out using bullets if you prefer, ensuring that the flow is logical (3b).

The presentation and written report should comprise the following elements:

1. Objectives: are the (if any) objectives clearly stated? Are they supported by the introduction and commensurate with the study design that follows? Justify your response. If the objective is not in PICO (PECO) format, please rewrite it accordingly.
2. Population: Describe the target and study populations.
3. Study design: What is the specific design? Is the design consistent with how the source population reflects the target population? Be specific in terms of how data were collected. If appropriate, create a graphical timeline of the study with important time points.
4. Identification of subjects and recruitment: Define the sources/processes used to identify and recruit subjects, including any inclusion/exclusion criteria; indicate the size of the study and participation rates, if provided.
5. Health outcomes: Describe what health outcomes were investigated and how they were ascertained, possible issues with validity/reliability, and measurement scales used (e.g., continuous, categorical).
6. "Exposures": Describe what "exposures" were measured, possible issues with validity/reliability of measuring these, and measurement scales (e.g., continuous, categorical).
7. Potential confounding factors: Describe what factors were measured, how they were measured, possible issues with validity/reliability, and measurement scales (e.g., continuous, categorical). Were any important variables omitted?
8. Statistical analysis: Briefly describe what statistical methods were used to analyze the data, what factors were included in the models, and what assumptions were made.
9. Results: Describe the main results, referring to the parameters that were estimated. Please ensure that you provide a clear description of the meaning of these results and what assumptions were made. Were the results presented in such a way that they reflected clearly the objectives of the study?
10. Conclusions: Strengths and weaknesses of the study, and possible conclusions and implications to public health and medical evidence towards regulatory policy and/or clinical practice. Do you agree with the authors' interpretation of the results? Is the information presented sufficient for you to draw your own conclusions? Do they differ from the authors'

References can be used to support your points.

## Assignment 3a-c: Project (group work)

Using any of the exposure(s) mapped in Assignment 1 in Montreal, students will formulate a hypothetical study design integrating the materials learned from the course.

If your team is not proposing standard etiologic study designs (e.g., studies other than case-control, cohort, ecological, time-series), you should first consult the instructor and TA. Literature can be used to rationalize the study aim, study design, and data analysis.

### Format:

- 3 min presentation of preliminary project proposal (ungraded)
- 15 min of presentation (3a), followed by 5 minutes of questions
- At least 5 suggestions to critique, per presentation (3b) Single-spaced document
- 3 or 4 pages for written project, excluding reference and tables/figures (optional) (3c)
- The presentation may be shorter in duration, depending on class size.

**Presentation of preliminary project proposal** (3 minutes, ungraded, Week 9) should provide:

1. Research question and its public health importance.
2. Objective
3. Proposed study design
4. Population, exposure and outcome

### Review of other projects (Assignment 3b)

Your group will be assigned two projects from other groups to review. Based on the presentation slides and oral presentation, your team will provide constructive review and suggestions to your peer groups. The details of this will be discussed in class. The submitted presentation and oral presentation will not be assessed, but the quality of your group's reviews of others' will be. The course instructors will review and provide additional feedback needed to make sure that everyone receives adequate and useful guidance in order to finalize their project writing. You should submit the review before the due date so that other groups can incorporate your review into their final writing. Groups who present Week 12 will review the projects in week 13 and vice versa (though all presentations may be completed in Week 12, depending on class size).

**Presentation and written description of project** (Assignment 3a and 3c) should follow the following components:



1. Background section including problem statement and the importance of the study design (justification). Why do you think your research question is important?  
  
-There is no need to perform a thorough review to identify your problem. Any environmental issue of your interest that provides a valid hypothesis is fine.
2. Objective: Clearly state the study objective supporting your research question in the PICO format. The objective must be feasible and attainable
3. Study design: justification of choice and brief overview.
4. Population: describe the target population and the intended study population. Describe any criteria for inclusion/exclusion and justify.
5. Identification of subjects and recruitment: define the sources to be used to identify and, if relevant, recruit subjects; explain potential problems and expected participation rates.
6. Exposures: describe what exposures will be measured, how they will be measured, possible issues with validity/reliability of measuring these, types of measurement errors, and measurement scales (e.g., continuous, categorical).
7. Health outcomes: describe what health outcomes are to be studied, how they will be ascertained, possible issues with validity/reliability of measuring these, types of measurement errors, and measurement scales (e.g., continuous, categorical).
8. Potential confounding factors: describe what accepted or potential risk factors will be measured, how they will be measured, possible issues with validity/reliability of measuring these, and measurement scales (e.g., continuous, categorical).
9. Brief description of statistical analysis and expected results
10. Conclusions and discussion: Strengths and weaknesses of the study and possible conclusions/contributions and relationship to public health.
11. References - any format is fine.
12. Table and figures (optional)

You can find relevant research designs, problem statements and discussions to follow from journals such as: *-Environmental Health Perspectives, Environmental Health, Environment International, Epidemiology, Environmental Epidemiology, and Environmental Science & Technology*

Though your project proposal writing will be much shorter than these full-length papers.

# Policy around the use of AI technologies for class assignments and presentations

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Generative AI is a type of artificial intelligence that uses machine learning to create new types of media, including text, images, software codes, sound, and video in response to user prompts (inputs). Many tools exist that use generative AI to create new content. Some examples include ChatGPT and Bing (text generation) and Midjourney and DALL-E (image generation).

Use of these tools to complete assignments and presentations is permitted as part of learning aids, as long as the three conditions are met:

1. Acknowledge the use of these tools. Specifically, you must cite the creator and the tool in your reference section at the end of your assignment and presentations. Instruction for citation, which you may need to familiarize yourself with future course work, publication, and report writing is provided at <https://style.mla.org/citing-generative-ai/>
2. Revise and check outputs from these tools carefully. In other words, you cannot copy and paste the crude (unedited) outputs from these tools into your assignments or presentation slides, as the raw responses from these tools tend to be flawed.
3. Submit and present any content produced by an artificial intelligence tool and the prompt (or chain of prompts) used to generate the content as an appendix with their assignments. In your presentation, you must also discuss how the tool was (or will be) used to assist in writing and/or slide making, such that other students can be informed with the effective use of these tools.

Note: While the use of generative AI tools is permitted in this class, many classes and scientific journals do not allow the use of these tools to generate writing (and any audio and visual contents as well as citations), as their raw outputs are often unreliable and may propagate/amplify misinformation, stigma, and stereotypes. Fact checking is critical when using these tools.

## University regulations and support

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## Inclusiveness

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I strive to provide an inclusive learning environment. However, if you experience barriers to learning in this course or have any impairments that could impede your learning, do not hesitate to discuss them with me and/or the Student Accessibility & Achievement Register with Student Accessibility and Achievement -SAA (you can register at <https://www.mcgill.ca/access-achieve/>). Eligibility for SAA is:

Students who are experiencing academic or physical barriers and have a documented disability, mental health condition, chronic health condition, or other impairment. These may be temporary, permanent, or episodic. Students with documented disabilities can register at any point in the year, but we recommend registering as early as possible. We encourage students new to McGill to make an appointment before their semester begins.\*

## Accommodations for missed assignments and presentations

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If you need to seek accommodation for missing in-course exams, assessments, or assignments for medical and non-medical or other emergencies, please discuss the situation directly with the instructor as soon as possible.

## Language of assessment

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In accordance with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

## Honor code

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Academic integrity is crucial. Therefore, all students must understand the meaning and consequences of plagiarism and other academic offenses under the Code of Student Conduct and Disciplinary Procedures (see [www.mcgill.ca/students/srr/honest/](http://www.mcgill.ca/students/srr/honest/) for more information).