

ENVR 301-51 – Environmental Research Design

Macdonald Campus - Winter 2026

Mon & Weds 10:05 am – 11:25 pm

Centennial T-105 (Macdonald)

Instructor (Course coordinator)

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MS2-078

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Instructor

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Student hours by appointment

Course Description

This course is designed primarily for students whose main interests are environmental problems and who will be engaging with research that may lead to identifying and finding solutions for these problems. The main objectives are to introduce students to the complexity of designing and developing environmental research studies, to encourage questions that incorporate multidisciplinary perspectives, and to give students the crucial skill of understanding the characteristics, strengths, and weaknesses of the wide variety of designs and methods found in environmental research. Students will be expected to participate actively in the life of this class in several complementary ways. These include: project presentations, writing exercises, and commentary and critiques on the work of others. The course is intended to give you basic knowledge of environmental research, with an approach of interactive learning meant to ensure the relevance of key concepts and to aid your own research interests. Assignments are designed to complement in-class lectures, and to provide practical experience with specific aspects of doing research.

The course is intended to be a transition for students, from the structured, often textbook-based mode of earlier Environment courses to the group work required in the ENVR 401 project course. A key part of this transition is the ability to read scientific research papers, which are sometimes very dense. Papers are different from textbooks, in that textbooks are in general clear and intended to be accessible, frequently written by experts in the middle and late stages of their careers. In contrast, scientific papers are written by people at all stages of their careers, including undergraduates or graduate students writing their first paper, supervisors writing up older material, and group projects developed by a team leader. They are of varying scope, style, originality, and quality, and can require a different set of skills than those you have

honed as a student focused mainly on textbooks. To enter the world of scientific research, you leave behind that comfortable, relatively well-organized world of textbooks and conventional wisdom, and enter a world of recent breakthroughs, false starts, failed hypotheses, tentative conclusions, and dreamed-of next steps. If reading a textbook is like following a road map from one known place to another, reading research papers is more like watching individuals and groups fan out across the landscape to draw that map, exploring at night using flashlights. At any given moment, you can only see a little ways ahead, and you're not totally sure where you're going.

Prerequisites

Completion of U1 Required courses in Environment, or permission of instructors.

Learning Objectives

By the end of this course, our goal is for students to be able to:

- explain the scientific method as a way of gaining knowledge;
- consider the ethical dimensions of environmental research;
- formulate a question of interest in a scientifically testable way;
- categorize existing research papers according to their research design;
- know several ways to collect data to answer a research question;
- understand how to choose an appropriate analysis technique for a given problem; and
- design an experiment or study to successfully execute a project.

Course content

- This course addresses both theoretical and practical aspects of environmental research design.
 - Because the course is co-taught by a social scientist and a natural scientist, we will provide examples and explanations from both of these frameworks.
 - Because you will need a practical set of skills for your own projects, we will present common techniques for gathering and analysing data and other resources that can help you with your own projects in this course and in the future.
- Our strategy is designed to help you to be able to quickly recognize and understand different types of environmental research designs as presented in research papers, and to know how to efficiently glean the relevant information from them. This knowledge will then be directly applicable for the many papers you will need to find and read for courses in the rest of your academic career-- notably, for ENVR 401.
- With these skills and a growing familiarity with how research is presented, you will create

research project proposals that choose a topic and present proposals for conducting environmental research that reflect the different research types seen in class. The project will be developed by students in small groups and presented to the entire class for consideration and critique.

Instructional methods

We will provide a varied instructional method throughout the course that is designed to give you the background and skills you need at each of the stages of the course.

- The first section of the course will overview the **big picture** ideas related to research design: the scientific method, the components of a research design, how to read research papers, and how to use the library for conducting research.
- The second section of the course will focus on the various ways **rigour** is established in different approaches to research: statistical, qualitative and ethical rigour will all be considered.
- The third section of the course will focus on reading and interpreting research papers of **different research designs**. Instructors will provide overviews of the different designs and students will take turns presenting on specific papers and the research designs used for each.
- The final weeks of the course will center on student research proposals, which propose projects on a theme, using the research designs encountered in the course.
- We will also have a substantial number of activities related to the class. These activities can include writing, small-group work, etc. They will be designed to be accomplished either inside or outside of class.

Course materials

In addition to materials presented in class, we have identified a set of research papers that you will read throughout the semester. The research papers have been selected on the basis of their specific kinds of research design -- longitudinal studies, for example-- and we ask you to read these papers and make careful, organized reports from these outposts of evolving scientific knowledge.

- The papers assigned in this course each have a different research design of importance to the course. It is your job to understand their structure and to be able to explain what each of these papers does, as well as how their designs are similar to and different from each other. You will find the list of papers for this semester in myCourses, along with the guidelines for what to do with them. In some cases, the papers are from McGill professors or students.

Assessments

Activity	Points
Quiz 1	20
Quiz 2	20
Research Design Paper: Group Presentation and Discussion	10
Term Project: 1. Short outline: 5 points 2. Group proposal presentation (5) 3. Group Paper (10) 4. Individual Critiques a. NSERC (5) b. SSHRC (5) 5. Group Critiques during panel events (5)	35
Contribution to Group Resource	3
Activities and Participation	12
Total	100

There will not be a final examination in this course. Unless stated otherwise, assignments are due by 5pm on the day they are due, and will be submitted according to the assignment guidelines. Additionally, we may incorporate feedback from your peers in grading the term projects or in-class assignments.

Note related to in-class activities

It is imperative that when you are requested to read articles or other material assigned ahead of time, you recognize this as crucial preparation that will enable you to participate in the course.

Fun things

In addition to school, we need to also have some fun. Here are two spaces where we'd love your contribution:

1. [Your favorite movie/TV recommendations](#)
2. [The ENVR 301 cookbook!](#)

Course Calendar

	Date	Topic
1	Mon Jan 5	Big Picture: Course Introduction
2	Weds Jan 7	Big Picture: Reading and Assessing Research Papers
3	Mon Jan 12	Big Picture: The Research Design Framework
4	Weds Jan 14	Fundamentals: Research Ethics (Last Day Add/Drop)
5	Mon Jan 19	Fundamentals: Qualitative Methods
6	Weds Jan 21	Fundamentals: Quantitative Methods <ul style="list-style-type: none"> • Our chatGPT survey
7	Mon Jan 26	Fundamentals: Quantitative Methods (continued)
8	Weds Jan 28	Research Design Types: Cross Sectional (Student Presentations - 1a and 1b)
9	Mon Feb 2	Research Design Types: Longitudinal (Student Presentations - 2a and 2b)
10	Weds Feb 4	Research Design Types: Exploratory (Student Presentations - 3a and 3b) Before Monday class: Submit exam-type questions for review
11	Mon Feb 9	Test Review Exam-type questions submitted by you <ul style="list-style-type: none"> • From 2024 • From 2022-3 • From 2021
12	Weds Feb 11	Test 1
13	Mon Feb 16	Crafting a Survey
14	Weds Feb 18	Research Design Types: Classical experimental (Student Presentations 4a and 4b)
15	Mon Feb 23	Fundamentals: Library Resources: Guest Lecture
16	Weds Feb 25	Research Design Types: Quasi-Experimental (Student Presentation 5)
	Mar 2 & 4	Reading Week: no classes
17	Mon Mar 9	Research Design Types: Meta-analysis (6) and Case Study (7) (Student Presentations 6 and 7) Preview of Group Resource (due 3/11 10:05am) Final project group self-selection deadline: March 10, 2200 hrs (pm)
18	Weds Mar 11	Review of Group Resource Intro to Final Project Project groups will be finalized before class Test Review
19	Mon Mar 16	Test 2
20	Weds Mar 18	Prepare Proposal and Presentation

		-- Project Outline Due at beginning of class
21	Mon Mar 23	Research Design in Practice: Profs/Guests present their own research methods
22	Weds Mar 25	Research Proposal Presentations
23	Mon Mar 30	Prepare for the NSERC Panel -- Written Proposals Due before class
24	Weds Apr 1	NSERC Panel NSERC Individual Reports due before class
	Mon Apr 6	No class: Easter Monday
25	Weds Apr 8	Prepare for the SSHRC Panel -- Any revisions completed before class
26	Mon Apr 13	SSHRC Panel SSHRC Panel Reports due, 2200hrs (pm). Last Day of Class!

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/students/srr/honest/ for more information).

In accord 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.

Note that instructional methods are subject to change based on public health protocols. In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

Sickness/illness during the term: Things happen and life's sometimes not as easy or happy as you deserve. Please visit Student Services (CC1-124) at Macdonald Campus if you are suffering from any emotional or physical health-related issues during the term. They can help you seek reasonable accommodation for in-course assignments, for medical or other emergencies, defined broadly. If approved, they'll send the request for accommodating you to all of your professors without revealing details of your situation.

END of syllabus