

# Research Principles in Interdisciplinary Science

ISAP 2002

**Course Instructor: Dr. Emma Hudgins**



**How to address me:** Emma

**Gender Pronouns:** (she/her/hers) ([learn more](#))

**Email:** emma.hudgins@carleton.ca

Note: If you have or question or would like to talk with me, you can send an email, visit me during student hours (see below), or approach me after lecture.

**Class Location:** 240 Paterson Hall

[Click here for visual directions.](#)

**Class Times:** Wednesdays, 14:35-17:25

**Prerequisites:** ISAP 2001 or permission from the Department.

**Student Hours: in person or on Zoom, by email appointment**

## What are 'Student Hours'?

Student hours are dedicated times for the course instructor to meet with YOU. Pop in to introduce yourself, ask questions about the course, or discuss content from the course.

*I acknowledge the location of this class at Carleton University, which is on the traditional, unceded territories of the Algonquin nation. In doing so, I acknowledge the ongoing legacy of colonialism in the practice of Western Science, and that I have a responsibility to improve land relations and relations with Indigenous peoples through the ways in which we engage in Western Science.*

## Welcome to this Course!

This seminar-style course will build on students' learning in previous ISAP courses and begin their exploration of data evaluation, experimental design, and communication across different disciplines. Students will use a project-oriented approach to address real science-based topics with local and global implications. This process will include identifying knowledge gaps and creating a research question, learning how to identify data types and knowledge from various perspectives, designing a robust experiment, and building communication skills. At the conclusion of ISAP 2002, students will have mastered aspects of the research project from the identification of a knowledge gap to the development of a viable and ethical research question and gained the skills to begin evaluation of related data and datasets.

## Course Outcomes

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

- Explain the concept and value of interdisciplinarity across the sciences and with the non-science fields and discuss science-related issues from diverse perspectives.
- Apply critical inquiry to question biases, identify credible sources of information, synthesize key points, and distinguish between coincidental, correlational and causal relationships.
- Investigate and synthesize aspects of a local issue with global implications and present the results of a review of the issue, recommendation for key stakeholders as participants, proposal for an inclusive consultation process and, an appraisal of potential ethical considerations.
- Address an issue by identifying a knowledge gap, developing a research question, designing data collection strategies, and identifying and evaluating relevant sources of information, including publicly accessible data.
- Locate and access publicly available datasets, design and apply data analysis methodologies, and interpret results and their implications.
- Explain the reciprocal influences of government policy and science on the decision-making process and its outcomes for science and society.
- Work as a team member, independently and collaboratively, and apply the professional skills of self-reflection, active-listening and respectful negotiation.
- Employ appropriate traditional and digital communication tools and styles to engage with a variety of audiences from the community and across science disciplines.

**Course Text:** No textbook purchase required. Readings of papers, reports, or other literature will be assigned in class and will be provided on Brightspace.

### Technology Checklist:

- Access to a computer with the ability of downloading R and RStudio software (Carleton computers should already have it downloaded),
- Microsoft Excel (can get a [free license](#) through Carleton).
- Access to a phone, tablet or laptop to complete in-class polls on PollEverywhere

**Communication:** Messages regarding the course, as well lecture slides, will be posted on Brightspace. If you have questions, email is the best way of getting a hold of me. I will endeavour to answer emails within 48 hours. If I email you a quick one-line reply, please don't take it personally – I am just trying to make sure I am answering emails as efficiently as possible.

[You must email me using your official student email address \(i.e., your cmail Address\). You must also hand in your assignments by uploading to Brightspace.](#)

### Community guidelines

1. By hearing and appreciating different viewpoints or opinions (even if you personally disagree with them), you can often make your own arguments more convincing and successful. However, please remember to always treat others with respect—personal attacks and pejorative or discriminatory language will not be tolerated.

2. This course is participation-oriented, and 20% of the grade is for participation. As such, active participation is a prerequisite for success. Professionalism is expected of you in all aspects of this course, and promptness is expected for each class.
3. Be prepared for an in-class discussion during each lecture related to the assigned readings and discussion question(s). During discussions, I ask you to be mindful of your natural level of participation. If you're someone who tends to dominate discussion, I ask that you're intentional about giving space for others to participate. If you have a tendency not to speak up, I ask that you try to be more intentional in sharing your thoughts. Nervousness during discussion will not be a reason for lost participation marks. Practice makes perfect - the more you push yourself to participate in discussions, the easier it will get!
4. If you are not able to attend a lecture in-person, I expect you to contribute an online discussion board post related to the assigned readings and/or discussion question(s) in the lecture slides (which will be available before each lecture) sometime during the week following the lecture. The same guidelines about respectful discussion apply to these posts. See also: <https://carleton.ca/online/online-learning-resources/netiquette/>

**Late Policy:** Quizzes are marked flexibly, where your top 2 of 3 Quiz grades are used. Therefore, no late Quizzes will be accepted. Other assignments will be given a 5% per day late penalty.

**Plagiarism and Academic Integrity:** You will be held to high standards of academic integrity (this is particularly important when reviewing and synthesizing other people's ideas). Academic misconduct related to plagiarism and academic integrity has serious consequences (see <https://carleton.ca/secretariat/wp-content/uploads/Academic-Integrity-Policy.pdf>).

### Grading:

Quizzes (Students will receive their two best Quiz marks)	10%
Research Question Design Assignment	20%
Data Management and Experimental Design Assignment	20%
Participation in class discussions, roleplaying activities etc.	20%
Final Project: Interdisciplinary Project Design and Group Presentation	30%
<b>Bonus pre-class survey</b>	<b>Extra 2%</b>

### Notes:

1. For participation in class discussions, I will be asking you questions on the reading assignments and class discussion topics. For this to work, you must have read assigned papers beforehand. If you miss a class, please post a response to the weekly reading on Brightspace using the discussion questions in the lecture slides. While discussion board posts must be posted within a week for participation credit, feel free to continue discussing these topics beyond the week deadline.
2. For the final project, you will be designing a research project that is communicated using different formats (including a presentation). I will provide a set of topics that groups can choose from informed by your pre-class survey.
3. The final Group project includes i) a policy brief (200 words max, worth 5% of the final grade); ii) a mini grant proposal (500 words max excluding references; worth 15% of final grade); and iii) a 20-minute group presentation summarizing the proposed project (10% final grade). Parts i-ii are to be done individually, but can be discussed with all class members. More detailed instructions will be provided in class.
4. There will be no exams. (While presentations are also nerve-wracking, they are much more valuable in the long run and worth practicing.)
5. I will be sending out a pre-class survey on Brightspace and by email to understand your interests in order to choose the set of topics for your final project, as well as to get a sense of your previous experience in ISAP and related courses. This counts for 2% in bonus marks!

### **Tips for Success:**

1. Do the readings. I am going to ask questions of everyone in the class. If you've done the readings, you'll be able to make the class more interesting and get easy marks!
2. Make sure you participate. This includes showing up for class, asking questions, and/or participating in the online discussion if you can't make it to class.
3. Do not leave assignments to the last minute, and hand them in on time. This means you will get timely and important feedback. I will be strict on word limits. This is more reflective of real-world scenarios, where wording around science interpretation and communication must be precise.
4. For your presentation, practice with friends beforehand. This can help to work out timing, awkward bits, and calm nerves.. By practicing presentation skills while you're in university, you will be better presenters when it really counts! **Plus, I will not mark you down for nervousness.**

**Course Schedule (may be subject to change):**

<b>Date</b>	<b>Topic</b>	<b>Content</b>	<b>Assignment due</b>	<b>Assigned Reading (to do before class)</b>
<b>January 11</b>	Introduction	We will introduce ourselves and go over how the course will work, its themes, goals, assignments, grades, communication, etc. We will also discuss how I can shape the delivery of the course to fit your needs based on your completion of a <b>pre-class bonus assignment</b> . We will also discuss the first reading, and I will give an overview on how to read a scientific paper and find literature. We will get practice interpreting conclusions and figures. This lecture should not be missed!	Pre-class BONUS ASSIGNMENT	Purugganan et al. 'How to read a Scientific Article'
<b>January 18</b>	Data to wisdom	We will start our material by introducing the different ways of looking at information and exploring the data to wisdom pyramid and various interpretations of it. We will learn the difference between multidisciplinary, interdisciplinary, and transdisciplinary research. I will quickly review how to find scientific articles, and we will do more practice with interpreting data and conclusions. We will discuss your perspectives on knowledge gained in your last course (and education so far). We will go over the first quiz assignment, comparing types of knowledge (5%), <b>due February 1<sup>st</sup></b> , and discuss the reading for next class.	Final set of topics for group project decided	Zinsstag et al. (2011) 'From "One Medicine" to "One Health" and Systemic Approaches to Health and Well-being'
<b>January 25</b>	The research process: interdisciplinary	We will delve into the basics of different knowledge types, the research process, and		CohenMiller & Pate (2019) A Model for

	research question development	review how to develop an interdisciplinary research question. We will get practice creating questions and hypotheses for interdisciplinary problems. We will learn how to evaluate the existing literature, while understanding the biases of the publication process. We will also discuss the Research Question Assignment, due <b>February 8<sup>th</sup></b> .		Developing Interdisciplinary Research Theoretical Frameworks
<b>February 1</b>	The research process: Quantitative and Qualitative data	We will discuss quantitative data, properties, and measurements. We will also discuss qualitative data, properties, and measurements with a focus on story and storytelling. We will discuss researcher positionality. We will learn how multiple lines of evidence can make for a more compelling answer to a research question and account for synergies in impacts across fields of study. We will go over any questions you have about the research question assignment and discuss the reading for next class.	Quiz 1	CBC Quirks and Quarks – Indigenous Astronomy clip  Holmes 2020. “Researcher Positionality – A Consideration of Its Influence and Place in Qualitative Research - A New Researcher Guide”
<b>February 8</b>	The research process: Ethical consultation	We will discuss the role of rightsholders, stakeholders, and other players in the research space. We will learn how to proactively bring in partners to the research process, and discuss participatory approaches. We will complete an Indigenous learning bundle on engaging with Indigenous communities. In light of these ethical considerations, we will discuss the topic and perspective	Research Question Assignment	OCAP principles guiding document  Vaughn & Jacquez (2020) ‘Participatory Research Methods – Choice Points in the Research Process’

		you'd like to focus on for your remaining projects.		
<b>February 15</b>	Research Design	Now that we understand how different types of data can be turned into knowledge, we will shift gears to discuss how we can plan to answer our research questions using experiments and data. We will begin by focusing on research design. We will discuss different types of experiments and studies and the different types of questions they answer. We will connect these methods to examples in the literature. We will discuss the second quiz (experimental design, due <b>March 8<sup>th</sup></b> ) and discuss the Data Management and Experimental Design Project due <b>March 22<sup>nd</sup></b>	Topic and groups of final group project decided	Tobi & Kampen 2017 "Research design: the methodology for interdisciplinary research framework"
<b>February 22</b>	WINTER BREAK	NO CLASS		
<b>March 1</b>	Data Management	We will continue our discussion of experimental design and begin bringing in elements of data management. We will learn where to find data across the suite of data types covered earlier in the course, while taking into account privacy and ethical considerations. We will formally assign the final project (group project on interdisciplinary design), which will be presented on <b>April 5<sup>th</sup></b> . We will do some simple analysis in RStudio on publicly available data. We will discuss experimental design examples, and practice coming up with experiments of our own.	Download R: <a href="https://cran.r-project.org/mirrors.html">https://cran.r-project.org/mirrors.html</a>  Download RStudio: <a href="https://support--rstudio-com.netlify.app/products/rstudio/download/">https://support--rstudio-com.netlify.app/products/rstudio/download/</a>  Laptop Loan: <a href="https://carleton.ca/itservicecatalog/loaner-laptops/">https://carleton.ca/itservicecatalog/loaner-laptops/</a>	Bring a computer with R and RStudio downloaded!  Gomes et al. (2022) - 'Why not share data and code? '

<b>March 8</b>	Data management cont'd	We will focus on the range of methods available for science communication and their benefits and drawbacks. You will get practice writing and evaluating media articles and policy briefs, as well as understanding how to write compelling grant applications in order to complete your final assignment.	Quiz 2	example policy brief on climate change impacts to the Rideau Canal. UW Madison's grantwriting handbook
<b>March 15</b>	Crossing disciplines	We will turn our focus from individual experiments to those incorporating multidisciplinary, interdisciplinary, and transdisciplinary approaches. We will use case studies to showcase the challenges, benefits, and general processes for these different approaches. We will roleplay different collaborator perspectives. We will also discuss the science-policy gap and how to fix it. <b>Guest speaker on interdisciplinary perspectives on the ground: Rachel Buxton</b>		Cairn (2018) <a href="#">“Evidence-based policymaking: political strategies for scientists living in the real world”</a>
<b>March 22</b>	The full research life cycle	We will continue with our case study examples and bring all of our learning together to discuss interdisciplinary research from knowledge gap to experiment phase. We will discuss the research lifecycle in the context of Forest Pest Management in Canada, and how open science practices can improve this cycle. <b>Guest speaker on open science practices: Pedro Braga</b>	Data Management and Experimental Design Project	Allison et al. 2021 -'Forest Biosecurity in Canada – An Integrated Multi-Agency Approach'
<b>March 29</b>	Project and presentation prep	We'll discuss your projects and presentations, exchange thoughts and ideas and generally help you prepare. I		NSERC guidelines on interdisciplinary grants



		will recap how to find literature, and how to write for different audiences. We will also discuss the final quiz, interdisciplinary research planning, due <b>April 5<sup>th</sup></b> .		
<b>April 5</b>	Presentations and wrap up	<b>Group presentations will take place.</b> Last Day! We will celebrate and discuss students' perspectives on what you have learned in the course and how it can be applied to your lives and your fields of interest. Students will complete a class evaluation.	Quiz 3	None
<b>April 12</b>	NO CLASS		Final assignment parts i-iii due	None

## Special Information Regarding COVID-19

It is important to remember that COVID is still present in Ottawa. The situation can change at any time and the risks of new variants and outbreaks are very real. There are [a number of actions you can take](#) to lower your risk and the risk you pose to those around you including being vaccinated, wearing a mask, staying home when you're sick, washing your hands and maintaining proper respiratory and cough etiquette.

**Feeling sick?** Remaining vigilant and not attending work or school when sick or with symptoms is critically important. If you feel ill or exhibit COVID-19 symptoms do not come to class or campus. If you feel ill or exhibit symptoms while on campus or in class, please leave campus immediately. In all situations, you must follow Carleton's [symptom reporting protocols](#).

**Masks:** Carleton has paused the [COVID-19 Mask Policy](#), but continues to strongly recommend masking when indoors, particularly if physical distancing cannot be maintained. It may become necessary to quickly reinstate the mask requirement if pandemic circumstances were to change.

**Vaccines:** While proof of vaccination is no longer required as of May 1 to attend campus or in-person activity, it may become necessary for the University to bring back proof of vaccination requirements on short notice if the situation and public health advice changes. Students are strongly encouraged to get a full course of vaccination, including booster doses as soon as they are eligible, and submit their booster dose information in [cuScreen](#) as soon as possible. Please note that Carleton cannot guarantee that it will be able to offer virtual or hybrid learning options for those who are unable to attend the campus.

All members of the Carleton community are required to follow requirements and guidelines regarding health and safety which may change from time to time. For the most recent information about Carleton's COVID-19 response and health and safety requirements please see the [University's COVID-19 website](#) and review the [Frequently Asked Questions \(FAQs\)](#). If you have additional questions after reviewing, please contact [covidinfo@carleton.ca](mailto:covidinfo@carleton.ca).

### Note About COVID-19 & Mental Health

The global pandemic has led to extra stress and uncertainty for everyone, and while we may all be experiencing the same storm, this does not mean that we are all in the same boat! If you are struggling, please do not hesitate to reach out. I am happy to listen, and/or direct you to resources that might help. In terms of class, if you need extra help or missed a lesson, don't stress! Email me and we will set a time to meet. I'll work with you, I promise. Remember that Carleton also offers an array of mental health and well-being resources, which can be found [here](#).

### Personal considerations

I want you to be able to engage meaningfully with this course. Please let us know if there is anything I can do to help make this possible. This can include letting us know about any accessibility barriers to either the online or in-person course content. I take students' mental health as seriously as their physical health. If at any point you feel you need additional support, Carleton's Counselling Services is here to help: [carleton.ca/health/counselling-services/](https://carleton.ca/health/counselling-services/).

## Specific Accommodation Requests

You may need special arrangements to meet your academic obligations during the term. Here are some specific cases with a defined process:

**Pregnancy obligation**

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: [carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)

**Religious obligation**

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: [carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)

**Academic Accommodations for Students with Disabilities**

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send us your *Letter of Accommodation* at the beginning of the term.

**Requests made within two weeks will be reviewed on a case-by-case basis.** After requesting accommodation from PMC, please follow up with us to ensure accommodation arrangements are made.

[carleton.ca/pmc](https://carleton.ca/pmc)

**Survivors of Sexual Violence**

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and its survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: [carleton.ca/sexual-violence-support](https://carleton.ca/sexual-violence-support)

**Accommodation for Student Activities**

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

For more information on academic accommodation, please contact the departmental administrator or visit: [students.carleton.ca/course-outline](https://students.carleton.ca/course-outline)

**Accommodations for Missed Work**

Carleton recognizes that students may be experiencing greater stress and other life factors that are not in their control. As a result, Carleton has put into place a protocol for students to apply for

accommodations using a self-declaration form in the event of missed work. The form can be found at: <https://carleton.ca/registrar/wp-content/uploads/self-declaration.pdf> Note that these forms should be used for short-term concerns related to missed work; if you are experiencing chronic, ongoing challenges which necessitate a broader solution, I recommend reaching out to the Paul Menton Centre and/or the Care Support team.

**Addressing Human Rights Concerns**

The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the [Department of Equity and Inclusive Communities](#) at [equity@carleton.ca](mailto:equity@carleton.ca).