RES 602 - Interdisciplinary Research Design for Sustainability Impact (Doctoral)

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RES 602 - Interdisciplinary Case Analysis and Research Design

Purpose in Brief

Course Description

Learning Objectives and Outcomes

Course Declarations

Course Policies

Attendance

Late Assignments

Academic Dishonesty

Course Objectives by Week

Week 1 – Jan 10: Introduction: Course expectations, structure, and content
Week 2 – Jan 17: Shaping ideas into concrete investigations: Critical evaluation of published papers
Week 3 – Jan 24: What is a research proposal? A review of successful proposals
Week 4 – Jan 31: What is your research question? What is impact to you?
Week 5 – Feb 7: Why is it important? Outline literature review and problem context
Week 6 – Feb 14: How to address it? Learn from your elders
Week 7 – Feb 28: Methods and rules of evidence: Understand your data
Week 8 – Mar 6: Analyses, predictions, research ethics
Week 9 – Mar 13: What are the implications of your research? How to measure impact?
Week 10 – Mar 20: Uncertainty resolved: Open problem solving
Weeks 11 – 13 Mar 27, Apr 3, Apr 10: Proposal presentations
Purpose in Brief

Students will deepen their understanding of interdisciplinary research processes for real-world impact on resources, the environment and sustainability. Students will use their own research and research by others to learn how sustainability questions are turned into meaningful answers through a staged process involving theories of change, researchable questions, related literatures, methods (qualitative and quantitative), rules of evidence and self-discovery.

Students will leave with literacy about the research process—including the development of proposals—interweaving the natural and social sciences and real-world considerations.

The goal of this course is to foster literacy in research methods and bring about familiarity with good research design and proposal development. The end product goal of the course is a defensible proposal for their own research program.

Course Description

In this course, students will learn how to turn ideas and topics of interest into researchable questions that are concrete, well-defined, and precise. Students will learn to identify appropriate research methods (qualitative and quantitative), rules of evidence, and strategies of proposal development. Students will map a project in relation to diverse literatures and learn to how to develop a research proposal.

The course will begin with the evaluation of published papers and successfully funded proposals. The remaining portions of the course involve an explicit focus on students’ own research designs, which will develop in stages and be iteratively peer-assessed. By the end of the class, students will complete a solid, review-ready proposal for their own thesis work.

Given the importance of understanding a wide range of research approaches, and the wide range of incoming academic and professional backgrounds among the students, much attention will be given to learning from interdisciplinary researchers and peers. This is an interactive seminar, where robust and consistent participation and attendance is expected of all students. Each week, class may include lecture, discussions, and a range of mind-mapping, brainstorming and reflective exercises. Weekly readings will be available on Canvas.


Learning Objectives and Outcomes

In this course, students will do the following:

1. Develop the necessary skill set to evaluate the quality of multiple examples of disciplinary and interdisciplinary research, including its logical underpinnings, its methodological approach, and the nature of evidence and theory employed.
2. Gain a concrete appreciation, through analysis of proposals, research publications and interaction with other researchers, of how different researchers approach a domain, including question formation, evidence collection and argumentation.
3. Learn the tools to critique, assess, and evaluate the effectiveness of different research strategies, data sources, and representation of ideas for different target journals.
4. Develop your own proposal with the aim of seeking funding, passing the proposal stage of your research.
5. Learn to design projects that might yield meaningful sustainability impacts in interdisciplinary contexts.
6. Learn to communicate your proposal ideas critically and creatively to specialist and non-specialist audiences, including the art of proposing work either as against or in contribution to that which has been already achieved in a given field.

7. Upon completion of the course, students will be poised to operate with methodological literacy in interdisciplinary contexts and to convert this knowledge to the analysis of cases and the development of research designs through proposals.

Course Declarations

1. The course instructor and your peers in the course likely know little about your research area, so use them as non-expert reviewers for your proposal. This means that you need to explain assumptions and basic literature in your field. This is your opportunity to educate them about your research.

2. Involve your research supervisor. Although the course doesn’t explicitly require your supervisor to read and provide feedback on your proposal, you should nonetheless check in with them regularly about your ideas as you develop your proposal.

3. Gain a basic understanding of social and natural sciences. Regardless of your background and previous training, it is beneficial to gain a basic understanding of how research works in social and natural sciences. Since this class relies heavily on group work and peer review, there are several ways to group people, and this needs to be determined by the instructor and the students. Here are a few ways to group students: (1) based on the same discipline (e.g., social science students in one group, and natural science students in another), (2) students with a natural science background wanting to incorporate social sciences methods into their research, and vice versa, or (3) based on the desire to collaborate with another colleague with shared interests and goals.

4. It's quite common that students produce a proposal at the end of the class and end up changing it or working on an entirely different proposal for their PhD work. What matters for this course is to gain the ability to write a solid proposal.

Course Policies

As per university requirements:

Attendance
Following university regulation, regular attendance is expected of students. Students who neglect their academic work and assignments may be excluded from the final examinations (note: there are no exams in this course). Students who are unavoidably absent because of illness or disability should report to their instructors on return to classes.

The University accommodates students with disabilities who have registered with the Disability Resource Centre. The University accommodates students whose religious obligations conflict with attendance, submitting assignments, or completing scheduled assignments. Please let the instructor know in advance, preferably in the first week of class, if you will require any accommodation on these grounds. Students who plan to be absent for varsity athletics, family obligations, or other similar commitments, cannot assume they will be accommodated, and should discuss their commitments with the instructor before the drop date.

Late Assignments
This course is not intended to run or ruin your life. So when exceptional circumstances will prevent you from completing an assignment on time, you may request an extension and it will be granted where possible and appropriate. In the absence of a granted extension, a 5% reduction of grade will be assigned for each day an assignment is late beyond the required due date.

Academic Dishonesty
Please review the UBC Calendar “Academic regulations” for the university policy on cheating, plagiarism, and other forms of academic dishonesty.
Students should retain a copy of all submitted assignments (in case of loss) and should also retain all their marked assignments in case they wish to apply for a Review of Assigned Standing. Students have the right to view their marked examinations with their instructor, providing they apply to do so within a month of receiving their final grades. This review is for pedagogic purposes. The examination remains the property of the university.
Course Objectives by Week

**Week 1 – Jan 10: Introduction: course expectations, structure, and content**

**Goals:** Introduce every member in the class and their research interests/topics. Overview course structure, content, and expectations.

**Week 2 – Jan 17: Shaping ideas into concrete investigations: Critical evaluation of published papers**

**Goals:** Understand research as a process of ideas posed, challenged, and re-written by critically evaluating published papers.

**Readings:**


**Assignment 1 (10%):** For each paper (Camilleri et al. & Centola et al.), identify the hook (0.5%), identify research questions, theoretical ideas and propositions (1%), describe the methodologies used and explain how theoretical constructs or variables are operationalized (1%), describe the results and conclusions (1%), discuss the implications of the findings (0.5%), and discuss strengths and weaknesses of the paper (1%). Submit your answers on Canvas before class.

**Week 3 – Jan 24: What is a research proposal? A review of successful proposals**

**Goals:** Unpack and review a set of proposals individually first, and then review these collectively – in panels like those struck by funding agencies.

There are many strategies for writing a winning proposal but all depend on the elements listed below, be the proposal aimed at researching a new topic, solving a problem or developing new methods. These elements include but are not limited to:

1. **A compelling hook.** You want any reviewer who reads your proposal to think “that’s an interesting problem!” You need to convince the reviewers why your research is interesting and important.
2. **A novel idea.** You need to demonstrate to a broad audience that the ideas in your proposal are new, necessary, and important.
3. **A good understanding of the relevant literatures.** You need to help the reviewers who might not be in your field understand the problem context. This is where you situate your research project in the broader literature.
4. **A well-defined and crystal clear research question.** You need to pose the question that is succinct and clear, and answerable in the time proposed and through the methods you put forward.
5. **Appropriate methods and data analyses.** You need to convincingly demonstrate what methods you will use, what type of data you need to collect, and what type of analyses you will conduct on your data.
6. **Novel potential findings and important implications.** You need to outline possible findings from your project, what these findings mean for your field, and what implications they have.
Logical flow. Your proposal should be a sequence of tight and logical arguments. You need to portray your proposal as a compelling narrative that sparks a curiosity that no one can resist.

Readings:


2. Two successful grant proposals (1 NSERC, 1 SSHRC) posted on Canvas

Assignment 2 (10%): Please analyze and critique each proposal in terms of its strengths and weaknesses. Keep the 7 points above in mind while evaluating the proposal. In your assignment, please explain what the hook is and how compelling it is (0.5%), explain how novel the idea is (1%), assess the adequacy of the literature review (0.5%), describe the research question and evaluate whether it is clearly defined (1%), describe the proposed methods and data analyses and discuss whether they are clearly outlined and sufficient (1%), and discuss potential findings and how significant the implications are (1%). Submit your answers on Canvas before class.

Week 4 – Jan 31: What is your research question? What is impact to you?

Goals:

- Create a novel, attractive, and compelling ‘hook’ (i.e., topic)?
- Define your research goals in a clear and concise manner
- Define the problem and frame it in a compelling manner
- Justify the importance and necessity of your research question
- Identify tractable and feasible questions
- Outline speculations, propositions, and hypotheses
- Anticipate what type of methods you will need to address your question

Assignment 3 (10%): Present in class a draft of your research question in one sentence in a compelling way (2%). Identify one applicable theory or construct pertinent to your own field (1%); define it for a broad audience and express it as a researchable question (1%) and a hypothesis (1%) within your own area of work. Also prepare a 20-second elevator pitch (3%) of your research question (what would you say when someone asks you what you are working on?). Define what kind of impact you hope to create with your research (2%). Submit your answers on Canvas before class.

Week 5 – Feb 7: Why is it important? Outline literature review and problem context

Goals:

- Understand the difference between a diagnostic and a descriptive literature review
- Import theories from your own and other disciplines
- Identify your target audience for your proposal
- Identify the critical body of literature in which you contextualize your research question
- Identify propositions (central claims that the previous literatures have made)
- Identify a model study which you might reasonably emulate

Readings:

3. You should select and review a minimum of 10 key papers linked to your proposed research.
Assignment 4 (10%): Present a draft of your literature review in class with proper citations and references. Draft an outline of the literature review (3%). Justify why these literatures are relevant for your project (2%). Identify the problem context of your project (3%). Identify your target audience (2%). In reviewing the relevant literature, you might need to revise your research question. This is not yet your full ‘literature review’, but instead serves an intermediate step to understand how to link your literature to your questions, which will in turn help ‘frame’ the literature review section in your draft and then final proposal. Submit your answers on Canvas before class.

Here are some hypothetical examples of topics and claims:

**Literature Name**: Land Use Change [e.g., topic or keywords and one sentence on what literature addresses, e.g., Theories and Methods of Remote Sensing – literature that seeks to detect patterns or trends in land use change.]

**Literature Claim**: Satellite measurement techniques fail to capture low-level deforestation changes (e.g., those more subtle than clear cutting)

**Literature Name**: Governance [theories of good governance, which addresses principles of civic participation, environmental citizenship, and role of non-state actors in the emergence and critique of public policy.]

**Literature Claim 1**: Transparent decision-making does (or does not) lead to better governance
**Literature Claim 2**: Multi-stakeholder engagement can foster the transition to a post-carbon energy economy

**Literature Name**: Human Dimensions of Conservation [conservation has a history of multiple human rights abuses, and has consequently moved toward better consideration of the social consequences of parks, protected areas, and biosphere reserves.]

**Literature Claim**: Many new conservation initiatives find that conservation initiatives can produce both social and ecological wins, but often such claims are premised on undefined variables.

**Week 6 – Feb 14: How to address it? Learn from your elders**

**Goals**: Understand how a faculty or senior PhD student, whose work bears some relevance to your own, thinks about methods and operationalizations. The material for this work will be derived from your interview assignment, noted below.

Interview questions:

1. What are your primary research methods and how would you briefly describe these?
2. What kind of data or research materials do you work with – e.g., qualitative or quantitative, textual, primary or secondary sources, etc.?
3. How do you go about identifying and collecting data for your studies? What do you consider the hallmark of good practice for doing so in your field?
4. When viewing written work in your field, what do you look for in a paper so as to judge whether the empirical material behind the work is of good quality?
5. Similarly, what do you look for so as to understand whether the data analysis done is of good quality?
6. How do you evaluate whether the conclusions drawn or claims made in a study are sufficiently justified by the data?

Assignment 5 (10%): Interview your supervisor or late-career PhD student or postdoc as approved by the instructor. Write up a summary (2 pages) of your interview outcomes. You should start with the 6 questions...
listed above, and you are free to add more questions if you wish. In your summary, please explain what the
responses are to each question (5%). Please also explain what, for them, constitutes good methodological
practice – meaning, good quality evidence or data, ideal methodological approaches (i.e., those they think
meet the ‘gold standard’ in their field), or best practices regarding analysis of ‘data’ however defined (5%).
Be sure to schedule your interview well in advance. Submit your answers on Canvas before class.

**Week 7 – Feb 28: Methods and rules of evidence: Understand your data**

**Goals:**
- Define your methods based on your research question
- Define the type of data you need and defend its legitimacy in reference to norms in your field
- Explain how you would collect the data and what measurements you would use
- Present your methods in a succinct and precise manner such that a non-expert can understand

**Readings:**


*And then either:*

A. If qualitative or interview based, chapters 11, 12 and 13
B. If quantitative, chapters 9 or 10 or approved alternates, and chapters 14 and 15

**Assignment 6 (10%):** Present your proposed methods in class. Explain what type of data you need in your
project (4%), defend and justify why you need these data to answer your research question (2%), and explain
how you would collect the data (2%) and what measurement tools to use (2%). Submit your answers on
Canvas before class.

**Week 8 – Mar 6: Analyses, predictions, and research ethics**

**Goals:**
- Identify the type of analyses you would do based on the data to be collected, defend the legitimacy
  of your analyses in reference to norms in your field, examples will be provided in class
- Explain what possible outcomes there will be from your analyses
- Understand research ethics regarding participants and data

**Readings:**

1. Koot et al. (2023). Research codes and contracts do not guarantee equitable research with Indigenous
  communities. [https://www.nature.com/articles/s41559-023-02101-0](https://www.nature.com/articles/s41559-023-02101-0)

2. Tynan L. (2024). Data Collection Versus Knowledge Theft: Relational Accountability and the Research Ethics

   [https://www.nature.com/articles/sdata201618.epdf](https://www.nature.com/articles/sdata201618.epdf)

   [https://static1.squarespace.com/static/5d3799de843604000199cd24/t/6397b1aff7a6fb54defdf687/1670885815820/dsj-1158_carroll.pdf](https://static1.squarespace.com/static/5d3799de843604000199cd24/t/6397b1aff7a6fb54defdf687/1670885815820/dsj-1158_carroll.pdf)
Assignment 7 (10%): Present your proposed analyses and possible outcomes in class. Explain what analyses you need to perform on your data (e.g., data coding, unit of analysis, statistical tests, assumption of the tests) (3%), explain why these analyses are appropriate in reference to norms in your field (2%), and explain the possible outcomes from your project (e.g., what are the primary outcomes, secondary outcomes, what would the results look like if your hypothesis is true) (2%). Describe the steps you will take to ensure research ethical standards are met (3%). Submit your answers on Canvas before class.

Week 9 – Mar 13: What are the implications of your research? How to measure impact?

Goals:
- Identify the theoretical and practical implications of your research project. This is especially critical because the granting agencies need to be sold on the importance of your research in order to provide funding. Justify the value of your research.

Assignment 8 (10%): Present the theoretical and practical implications of your research project in class. Explain what theoretical implications (4%) and practical implications (4%) are of your project. For example, you can describe how your proposal advances current theoretical understanding, what new insights can be revealed, what kind of policy implications there are, and any implications for sustainability, management, operations, or advancing methodology or tools. Describe what kind of impact your research might create and how to measure such impact (2%). Submit your answers on Canvas before class.

Week 10 – Mar 20: Uncertainty resolved: Open problem solving

Goals: Pull together all pieces into one coherent proposal. It is the one week where you get to come to class with any and all uncertainties as yet unsolved about how to piece together your proposal. We will have some small group and 1:1 problem solving as well as some demonstrations on how to knit the pieces of your work together.

Weeks 11 – 13: Mar 27, Apr 3, Apr 10: Proposal Presentations

Assignment 9 (10%): In these weeks, each student will present their full draft of the research proposal in class and get feedback. The instructor will take notes of all comments offered to provide the presenter. This is what is known as a proposal pitch and often occurs when seeking funding for larger projects – usually facing a group of people from the funding agency and a panel of peer reviewers who get to question assumptions made or ask clarifying questions. The class will simulate a grant panel and offer an evaluation at each presentation. Your presentation should contain a compelling hook (1%), clearly defined research question (2%), adequate and concise literature review (2%), proposed methods and analyses (2%), potential outcomes (1%), and implications of your research (2%).

Apr 12: Final proposal due

Assignment 10 (10%): Final full proposal is due 12pm, April 12. The proposal should be no more than 6 pages single-spaced (excluding references which are on separate pages), with no more than 3 additional pages of appendix. Your proposal should contain a compelling hook to explain what the problem is and why it’s important (1%), adequate and concise literature review to provide a sufficient and compelling context for your research (2%), your research question with clearly defined constructs and propositions (2%), proposed methods and analyses (2%), potential outcomes (1%), and theoretical and practical implications of your proposed project (2%).