

# ERS 411/412 Senior Honours Project

2013/2014

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*Mary Louise McAllister, coordinator*

*Individual professors advise each student directly*

Note: To take ERS 411/412, you must have signed an approved contract in ERS 411/412 well in advance (normally two terms) of the term in which you undertake your senior Honours project.

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## THE BASIC SURVIVAL GUIDE AND EXPECTATIONS OF 411/412

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**Preamble: You made it to the 4<sup>th</sup> year thesis (“411/412”) Congratulations!** The goal is for you to tackle a topic related to environment and resource studies and turn it into a tractable research project that advances knowledge or leads to some form of novel action in trying to resolve an issue.

**Choose your own adventure:** By this stage, it is time to spread your wings and be creative. The course has no formal lectures but there are some required components as follows

- 1) This course is taught in sections by your advisor on Wednesday mornings. Make sure that you are signed up for the correct section under your advisor’s name
- 2) There is an overall syllabus but your advisor may choose to have an additional syllabus
- 3) Your advisor will also have his or her own Learn website that you should check regularly
- 4) Submit a project or thesis proposal to your advisor for marking along with the research ethics forms by the end of November. **Research ethics forms and your proposal are to be submitted before the December holiday break and uploaded on the website.**
- 5) Defend your thesis at a seminar (with a Power Point presentation at the end of the winter term)  
Pass/Fail requirement
- 6) Submit your final project last day of classes in winter term and upload to the website.
- 7) You must also meet with your advisor on a regular basis. There is a reserved slot (Wednesday mornings) that advisors use for weekly or bi-monthly meetings with their group of students.

**Note: Wednesday mornings have been reserved for important 411 meetings and presentations. Make sure that you don’t register for other elective courses at this time. Also make sure that you register under your advisor’s section and not someone else’s slot.**

**Elements of 411/412:** This is a research project in the general sense but is really a senior undergraduate thesis project – as the researcher, you conceptualize a project, conduct a thorough examination of peer-reviewed (and other relevant) literature, determine a research question, design a methodology to answer the question, analyze results, draw conclusions, and present your project with a Power Point presentation.

**Context and rationale:** Mastery of the basic skills of problem definition, proposal preparation and project implementation are key to dealing with a wide range of 'real-life' situations, both on and off the career

path. In the 411/412, each student has an opportunity to develop these skills further by designing and implementing a project of special personal interest.

**Solo or team:** Students may, if they wish, work as a small team in carrying out their 411 project. In this case, the role and contribution expected of each member must be clear at the time the project is approved, and the input of each team member to the project must be identifiable in the end product in a way which permits individual assessment.

**The difference between 411 and 412:** The project may be undertaken for extra credit, in which case, a student enrolls in 412A/B (2.0 credits). Undertaking work for more than 1.0 credit must be discussed with, and approved by the advisor and the 411/412 coordinator. Think of a 412 project as one demanding about 18 hours a week. It would be expected that a 412 project have the potential to be published, or similarly substantive in an appropriate context.

### **What are the minimum standards for 411/412?**

- Originality - do not undertake work that already has been conducted.
- The project should be one that gives ample opportunity to acquire and/or demonstrate a reasonable mastery of relevant skills and subject matter, yet also be manageable within the time that can be devoted to it. Keep in mind that it is to be seen as equivalent to an academic course of two terms' duration, rather than a 'term paper' for a one-term course. If 411 is one of five courses you carry each term, 9 hours per week is not an unrealistic expectation of time to devote to all phases of your project. The scope of the project, results produced, and the final report will be judged accordingly.
- Do not treat this course as producing a simple, large term paper. You can write a thesis that uses only secondary literature and does not include field work. It must, however, be intensively researched. It would also reach the top of Bloom's Taxonomy which includes analysis, synthesis and evaluation. <http://www.learningandteaching.info/learning/bloomtax.htm>
- The 411 project is to be treated as professional research and action experience. All work must contain some form of scholarship and must reflect critical thinking.
- You may advocate a position but the thesis must meet acceptable standards for academic integrity and quality.
- A 411 project may be primarily a research effort involving original data collection and analysis. Assignments which are developed as written research projects should be presented as research papers in a form suitable for publication in a scholarly journal. Follow the style of a journal related to your field to ensure conventional format and style for such papers— one you might wish to submit a paper for consideration.
- A 411 project may also combine active community or university involvement with an analytical, or other, written appraisal of the experience. It may involve approaches that are less conventional. Examples in the past included organizing community advocacy groups (with the provisos above), a concert to promote environmental awareness, a musical workshop by ERS student Hingman Leung that included Juno® winning artist Sarah Harmer, an environmentally themed theatrical play by Crystal Bradford that was staged professionally, and an extensive treatment by Jonny Olsen for a children-focused environmental

entertainment program that ultimately became a reality. If you want to do something off the beaten track, be creative and serious to the extent that it is a substantial piece of work.

**Advisors:** We have advisors who are ERS professors who will guide your graduating projects. See the attached list. Make sure you approach a potential advisor early and get a contract signed. If you leave it too late, you will need to enroll in ERS 413 which is the alternative to the ERS 411/412 project. You need to successfully complete one of those three, namely 411,412 or 413.

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## THE FORMAL 411/412 PROCESS

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- If you are enrolled in the ERS 411/412 course, you must have a contract signed by you and an approved advisor and submitted to Patti Bester in the semester before you begin your 411/412.
- The contract is online and can be printed out and submitted to Patti Bester in person or scanned in an emailed to her. Make sure that Patti, you and your advisor all have copies of the contract. **If there is no contract, you will be required to take ERS 413 instead of ERS 411/412 in the Fall of 2013.**
  - ERS 413: course weight 1.0 credits Senior Honours research paper and seminar:
    - This course consists of intensive readings, seminar discussion and a major one-term research paper. **It will be taken instead of ERS 411/412.** Students will be required to produce a one-term analytical research paper that will be primarily grounded in secondary material and course readings. Students will be expected to participate in weekly discussions based on demonstrated knowledge of the assigned readings and present their research paper at the end of term.
- Meet regularly with your advisor (once every two weeks at a minimum) to discuss your 411 progress and, where required, submit a written draft of the elements of the proposal (in 411/412/492A term) and the proposed work (e.g. draft sections or chapters) at each stage according to the deadlines set out in the formal proposal/contract with your advisor. Again, this will vary from advisor to advisor.
- You will prepare a detailed project proposal in regular consultation with your advisor. (You may wish to follow the steps laid out for completing a proposal that is posted on the UW Learn course site. That is a decision to be made by your advisor and you.) This project proposal forms the basis of the deeper agreement between the student and the advisor. Generally, expect to include the following:
  - description of the proposed work, that is, a description of the general problem area; an outline of the specific questions/issues to be addressed; a preliminary list of expected sources of information (references, people, places); a summary of the results of your initial literature search. Be sure all of the above are included. Some advisors may wish to have you do a more extensive literature review at this juncture so be sure that you are clear about your advisor's expectations.
  - discussion of the importance of the proposed work in terms of your chosen model, that is, its relevance to the proposed client, or to the general advocacy issue, or to the disciplinary or interdisciplinary research community, or to some other model you are using.
  - breakdown of the steps to be taken to complete the project, described in terms of the specific tasks involved, for example, collect data from this source, complete literature search on this question, carry out analysis of this debate.
  - methodology
  - description of the output: paper(s), presentations, other media if applicable.

- proposed evaluation process: by advisor only or with involvement of external advisors or resource people, if any
  - a work schedule, with dates, showing how this work is to be divided into stages, what product is to be expected at the end of each stage, and deadlines
  - a draft table of contents, where appropriate
- Your proposal is to be submitted to your advisor for assessment and comments: It is a pass/fail (or your advisor may decide to assign a grade to the proposal determined in the first week of classes). In any event, you cannot proceed until the next stage until you have the go-ahead from your advisor, and ethics approval (if required). Grade at term's end is "IP" (i.e. in progress). The final grade after the thesis is finished will be applied to your two term courses (ERS 411A and 411 B).
  - In your 411B term, you will continue to meet regularly with your advisor as you move forward with implementation of your proposal. You will submit to your advisor a preliminary draft of the final report or other product at least one month before the end of your 411B term. Ordinarily, a 40-page maximum will be suggested, but your advisor will discuss this with you, as well as any different arrangements that need to be made because of the nature of your project.

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### GRADING STANDARDS AND GRADING PROCESS IN ERS 411/412/492A/B

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**You are required to submit to your advisor a one-page single spaced summary** of the proposal in mid-October that includes the following information: research objectives and questions; specific examples of scholarly and comparative literature and journals; methodology or approach; clear outcomes regarding the scope and the short and long term applications of the project.

**Thesis or Project Presentation: 15% of Final Grade in ERS 411/412**

**All students will participate in the presentations scheduled for the last two Wednesdays of classes in winter term during the 411/412 class slot**

**Final Thesis Project: 85% of Final Grade in ERS 411/412 (your advisor may also wish to assign part of that grade to a the thesis proposal or just have the proposal as a required milestone)**

Your final 411 project is due on the final day of lectures in winter term. An e-copy will be posted to your Learn website by 23:59 h on the last day of lectures. A second copy will be sent to the advisor for evaluation (advisors can require e-copies and/or paper copies). The advisor grades the thesis basing the mark on the entire eight months of work and expectations agreed upon by advisor and student. The thesis must include a written component (and for most theses this will be the only product). For those doing projects that involve media in addition to a form of scholarly written work, the criteria can be adjusted at the discretion of the 411/412 advisor. These discussions must be concluded by the first Monday of October in fall term. Late penalties are determined by the advisor.

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## 411/412 PROJECT ADVISORS AND TOPIC AREAS OF INTEREST

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ENVIRONMENTAL CHANGE AND GOVERNANCE

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Derek Armitage

Office: EV2 2013

Email: [derek.armitage@uwaterloo.ca](mailto:derek.armitage@uwaterloo.ca)

Ext: 35795

Derek is open to advising students with an interdisciplinary orientation and interests at the intersection of *environmental change* – gradual/incremental or sudden/unexpected changes in ecosystems and ecosystem services - and *governance* - the processes and institutions through which societies make decisions that affect the environment and in response to environmental change). For example, projects may involve:

- examining resource use strategies (with regard to water, fisheries, forestry) of communities and factors that undermine or foster the sustainability of those strategies (like co-management arrangements);
- understanding social-ecological impacts of resource developments (like pipelines and mines) and other types of human activities to improve decision making and policy
- analyzing and understanding the vulnerability (or resilience) of individuals, communities or regions in the context of hydro-climatic change;
- assessing how communities respond and adapt to change (i.e., climate change, over-harvesting of resources) and/or develop strategies to transform unsustainable conditions through collaboration, collective learning, and community-based approaches (like a community-based monitoring program);
- examining the relationship between changes in ecosystems/ecosystem services and peoples wellbeing or sense of place (e.g., what does it mean for coastal communities when their shoreline erodes because of increased storm severity)
- strategies to link science/scientists with policy makers and communities to address particular issues (e.g., plastics or contaminants in the Great Lakes)
- assessing existing policy and collaborative governance arrangements (e.g., in the context of water, forests, climate) to determine if they are legitimate, adaptive, etc. and if they lead to ecologically sustainable outcomes
- methods to analyze networks of actors and the flows of information and knowledge that contribute to better decision making and governance at local-global scales
- bridging knowledge systems (western science, local and traditional knowledge) about particular environmental resources or conditions

Derek's work is typically focused on aquatic systems (freshwater and coastal-marine) but he has experience in other resource and environmental contexts and is open to a broader range of contexts. Additional information and maybe some ideas can be found at: <http://ecgg.uwaterloo.ca/>

### Derek's 411 process

Students are encouraged to come with some initial project ideas or areas of interest. We will collaboratively think through where (e.g., locally, provincially, internationally) and how (e.g., in the field, using just the literature) those projects can be implemented. You will be encouraged to choose a project that will, to varying degrees, allow you to be:

1. Systemic: thinking in terms of social-ecological connections and their feedbacks across scales;
2. Critical: not accepting the obvious explanation and challenging the relationships of power that influence sustainable outcomes; and
3. Applied: building skill sets you can use in different settings.

Students will lead the process but you will have plenty of interaction with Derek to ensure that your project is 'doable'. We will meet as a group on a regular basis to cover common themes (e.g., crafting the research questions, approaching a literature review, thinking about methodology). However, a major objective of group meetings is to co-learn with your colleagues and benefit from constructive feedback on your evolving ideas and thesis outputs. Milestones and deadlines for 411 projects are clear and students will be expected to meet those milestones.

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## WILDLIFE ECOLOGY AND MANAGEMENT

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*Brad Fedy*

*Email: bfedy@uwaterloo.ca*

I am happy to advise 411 students with interests in wildlife ecology and management. Most of my research focuses on quantitative approaches to addressing ecological questions. Thus, I am also willing to discuss potential research projects with any students wishing to use quantitative methods in their research regardless of whether it is specifically related to wildlife.

I have a number of research ideas that could be the focus of a critical literature review. Research topics of interest to me that could be the focus of the review include:

- Habitat selection and prioritization for multiple wildlife species of concern.
- Climatic influence on population fluctuations.
- The prevalence and impact of inbreeding depression in wildlife populations.
- Comparison of direct (e.g. radio telemetry) and indirect (e.g. genetic) methods of measuring animal movement.

Note that the critical literature review projects would not involve extensive statistical analysis.

However, for students interested in further developing their quantitative skill set I also have a number of large-scale data sets that could be used to address a myriad of questions in habitat selection, population trends, and energy development impacts. Students with experience in GIS wishing to pursue research questions involving spatial analysis are also welcome.

I am also happy to discuss the possibility of field-based research with students. However, in these cases, I expect the students to have some idea of the type of research questions and field-based work they would be interested in pursuing. In other words, I currently have fewer "off the shelf" research projects that involve field research.

My group of 411 students will meet weekly to collectively work through our research problems. I expect a high level of commitment from my students and a willingness (and drive) to learn new approaches and techniques.

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## COMMUNITY GOVERNANCE AND ACTION RESEARCH

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*Mary Louise McAllister*

*Email: mlmcalli@uwaterloo.ca*

Are you interested in doing a project related to action-based research\*; something that is directly related to an activity that is meaningful to you?

One example of action research project that I am working on is one that helps a colleague who established a co-operative of organic cotton farmers in India to market products provided on the cooperative farm here in Waterloo. Let me know if you want to hear more about this project. Other suggestions follow.

- Do you volunteer at a local community organization in some way such as the Working Centre, in a community garden, with *Alternatives Journal*, local artisans, a multicultural centre, etc.?
- Did you work for a local government on sustaining communities in some way and would like to explore that further?
- Are you interested in social or green entrepreneurship?
- What is the role of adult environmental education? What about environmental education here at UW?
- What are the issues of sustainable governance in Canadian rural communities?

I am open to suggestions and ideas. Come with some and, together, we will brainstorm about possible projects and opportunities

- *Put simply, action research is “learning by doing” - a group of people identify a problem, do something to resolve it, see how successful their efforts were, and if not satisfied, try again. ( Rory OBrian, An Overview of the Methodological Approach of Action Research”, University of Toronto, personal webpage, 1998, [http://www.web.ca/robrien/papers/arfinal.html#\\_Toc261846521998](http://www.web.ca/robrien/papers/arfinal.html#_Toc261846521998))*

## RESTORATION AND CONSERVATION ECOLOGY

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*Stephen Murphy*

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*Office: EV2 2034*

As an ecologist, I have interests in both disciplinary and transdisciplinary research. This is because the source of environmental problems and solutions rarely exist within the domain of one scale (e.g., individuals, populations, landscapes) or discipline (e.g., biology, politics, economics, agronomy).

Projects of Possible interest include

- Restoration ecology
- Invasive species ecology
- Conservation ecology in parks and protected areas
- Community ecology interactions

I am also open to suggestions about other projects. Send me an idea or come speak to me.

## RENEWABLE ENERGY, SMART GRIDS, ENVIRONMENTAL POLICY AND GOVERNANCE

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*IAN ROWLANDS*

*Email: IROWLANDS@UWATERLOO.CA*

*Office: EV2-2026*

Ian Rowlands is happy to consider students interested in applying to do their '411' with him during the 2013/14 academic year (that is, Fall 2013 and Winter 2014). In this document, Ian's areas of research interest/capacity – that is, those areas in which he has sufficient knowledge to advise students – are identified. His expectations for ERS 411 students are also laid out. Information about Ian's current research agenda can be found at <https://uwaterloo.ca/environment-resource-studies/people-profiles/ian-rowlands>. He is willing and able to supervise students in the following areas:

a) Sustainable electricity

Much of Ian's current research activity revolves around 'smart grids' – ways in which electricity systems can be transformed with advanced information and communication technologies and active electricity management. Areas for research include: customer motivations and actions for conservation, demand management and deployment of renewable electricity; evaluating policy alternatives and exploring policy options; analysis of consumption/production data. He is very excited about this issue-area, and would be delighted to brainstorm with you about potential research topics.

b) Decision-making

Ian is interested in 'decision-making' across many environmental issues-areas. While 'energy' and 'climate change' are the ones in which he has most experience, he is happy to consider other issue-areas as well. The 'decision-making', moreover, can be by any of a variety of actors (individuals, households, companies, governments, NGOs, etc.). It is anticipated that core research questions might well include: 'Why was a particular environmental decision made or not made?'

c) Governance

Defined as the ways in which actors make collective decisions, Ian is interested in governance across a variety of issue-areas and 'scales'. With respect to the former, again 'energy' and 'climate change' are ones in which he is most knowledgeable, but he is happy to consider others. Regarding scale, in a previous life (same body ... different decade ... mainly the 90s), 'international' was his primary scale of attention; since then, he has explored many different parts of 'multi-level governance'. Thus, similarly, he is willing to consider other areas. It is anticipated that core research questions might well include: 'Why

did a particular governance structure arise in the way that it did?' or 'Evaluate – on some criteria – the “governance arrangements” for a particular issue-area.'

### Expectations of Ian's

You may have had Ian as a professor for a course before; you may not have. If you have, you probably have an understanding of his approach. If not, ask someone who has.

critical steps involved in identifying and defining a researchable problem, establishing an appropriate research question, locating appropriate methodology and methods, executing research steps systematically and transparently, recording results, developing discussion and arriving at conclusions and recommendations that are proportionate to the research you undertook and to the research question you asked. He is open to a variety of research methods, and looks to students to identify those that are appropriate to the task at hand (and, of course, the skillset that the student wants to develop).

He anticipates that his group of 411 students will meet – for the most part – collectively (once a week) and together 'travel through' the research process, providing mutual support and offering mutual critiques. The topic is left to you, but his 'default' expectation is that your work will be high-quality research. Another expectation is that you will work hard, and so he will lay out a framework, and expect you to 'keep up'. This is independent work, but – to offer a metaphor – the train is pulling out the platform in early September 2013, and you are expected to be on it, and be ready for the 'various stations' that follow.

Ian is happy to have a conversation with any students who have reviewed his 'areas of research interest and research capacity' and his 'expectations' and are still interested in exploring the possibility of supervision.

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## “WATER WATER EVERYWHERE...”

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Sarah Wolfe

Email: [sewolve@uwaterloo.ca](mailto:sewolve@uwaterloo.ca)

Office: EV2 2011

I am happy to advise students' 411 projects that fit within the broad theme of "social dimensions of water resources" including environmental sociology, psychology, human geography, gender studies, international development, political science or sustainable building (I.e., water efficiency or reuse technologies). For students who aren't sure what topic they want to undertake, I also have a evolving list of off-the-shelf projects — some requested by my industry and government colleagues and others that are part of my research program. I've listed a few of these off-the-shelf projects below that are available for 2013-14:

Region of Waterloo: A good student research study might be to measure human perception and behaviour related to weather. If you ask people, would they think this summer was hotter and drier than last summer? What weather triggers people to water their lawn? Is it consecutive days without rain, or is it the daily temperature? Maybe it's a combination of both? Or has it got to do with how their grass and gardens look? Maybe some people actually measure soil moisture or calculate ET rates to decide when to irrigate. I have my ideas about this but nothing scientific. Just wanted to throw this your way in case someone is interested in the topic.

Region of Waterloo: an urban ecology-type project. There is no doubt that the ban on cosmetic pesticides and the once per week lawn watering restriction in Waterloo Region is having an effect on the appearance of lawns. I don't have any hard evidence to prove this though. One of my students this summer had family in Mississauga, and she said that lawns there appeared much greener than they are here, which probably means ours went dormant and brown due to lack of water. Dormancy is one thing, but death of the grass is another. The question is, what is happening here? Are there more bugs eating the grass (cinch bug, grub, etc.)? Or are the shallow-rooted grasses not able to withstand drought for extended periods of time? If the causes are apparent, then what are the solutions? Changing the ground cover is one solution, but what about people who want to stick with grass?

Southern Ontario Water Consortium (SOWC): The SOWC is a partnership of eight Ontario Universities including UW, funded by the Federal Economic Development Agency for Southern Ontario, the Province of Ontario, and IBM

Canada, and supported by numerous private and public partners. The SOWC's mandate is to build and deliver a platform to enable innovative research, development, testing, and evaluation on a wide range of water-related topics, including watersheds, drinking water, wastewater, sensor development, analytical techniques, ecotoxicology. IBM's participation allows the building of an end-to-end data platform to aggregate data from instrumented sites and understanding their connections through advanced data analysis techniques. There may be a research opportunity to work with SOWC, particularly on a topic related to data/information technology/social media and water management. What are the current trends in bridging technology and data management with social media and actual decision-making? It may be informed by a new Assessment getting underway by Council of Canadian Academies on "Potential for New and Innovative Uses of Information and Communications Technologies (ICTs) for Greening Canada" <http://www.scienceadvice.ca/en/assessments/in-progress/greening-canada/expert-panel.aspx>

#### *OTHER POSSIBILITIES*

- Terror Management Theory and water resources paradigm (critical literature review)
- Analysis of Mexico and Canada data on women representation and participation in water sector (data already mostly collected; literature review, data analysis needed)
- Public relations and curriculum evaluation/comparison of municipalities, NGOs and private companies' campaigns for or against bottled water consumption (data collection, literature review and analysis needed)
- Assessing pedagogical best practices for university-level water knowledge and skills development