Teaching statement:
Creating a clear, adaptive, participatory learning environment

Table of contents

Teaching philosophy

For me, the teaching and supervision of students are very important and satisfying components of being an effective, well-rounded scholar. To be an excellent teacher, I must cultivate and communicate passion for the subject, and at the same time channel that passion into lasting, practical insights and skills. Excellent teachers and researchers must follow and learn from other practitioners, and be willing to be creative and take risks to continually improve their ability to connect with learners. Unfortunately, the academic world often emphasizes and incentivizes the research role of the modern scholar—often to the detriment of teaching quality. Before starting my tenure-track career, I was repeatedly warned that I must "publish or perish", and to put less attention on my teaching.

However, I have learned very quickly that to have the rewarding, satisfying career that I crave, I must build an engaging, effective learning environment for all students I work with. In the teaching role, **I play with "fire": the passion of learning—a living combination of knowledge, skills, critical thinking, curiosity and real-world application.** When I teach undergraduate learners, I play the role of the fire-starter. I inform, challenge and stimulate learners, setting up the optimal learning environment to "ignite" their interest in the subject (e.g. environmental issues). When a student catches this fire or passion, then another layer of learning can begin—students become active in their pursuit of knowledge and understanding, and in doing so can spread this enthusiasm to their peers.

My experience with teaching graduate students follows a slightly different trajectory. Given the environmental focus and highly-competitive nature of my present program (REM), graduate students typically enter with a pre-existing dedication to solving real-world environmental issues and challenges. In some cases, this passion is almost too strong—reasoning and learning is often limited by preconceived emotion and bias. In this context, my role changes from fire starter, to that of the fire keeper. **I work to channel students' energy and interest into the learning of critical thinking and profession skills, as well as the appreciation of perspectives and approaches that differs from one's own mindset**.

General teaching approach

The courses I teach vary by student base (undergraduate or graduate) and the nature of the topic (general concepts versus specialized skills). Thus, my learners' needs vary by course and often by section of a given course. But I do follow some general principles that I find to be useful for any learning environment. My use of these principles is evolving based on my increasing experience with teaching and training.

- **Clarity of expectations**: through teaching experience and training workshops, I have come to appreciate the importance of clearly articulating expectations for students. In particular, I now use "learning outcomes" to structure the main objectives of my overall course, and of each lesson within that course. I then construct and arrange my assessment techniques (tests, assignments, etc.) to directly address assess and reinforce those learning outcomes. For example, one of the primary learning outcomes in my graduate course on Ecological Economics (REM-621) is that learners shall be able to "understand and critique the use of economic concepts in academic articles and reports addressing environmental issues." To reinforce this outcome, the students must complete a three-page "economic review" as their final assignment—summarizing and critiquing an economic journal article or report using course concepts and other literature. Students in my classes have provided very positive feedback about the clarity provided by these learning outcomes. Similarly, I also provide short **"reading guides"** for most assigned readings to guide students to focus on the main points of the lessons. While using learning outcomes, I also make sure to maintain a degree in flexibility in each class (particularly at the graduate level) so student interactions with the instructor can still influence the structure and framing of the learning outcomes in order to better meet learners' needs.
- **Teaching as dialogue**: in every class I work to establish a dialogue with students. I seek to understand their (typically diverse) backgrounds in education and life through conversation in smaller classes, or by administering an "about you" questionnaire in larger classes. Before beginning a lesson, I will try to understand students' previous exposure to the topic using techniques such as discussion questions or "clicker" exercises (described below). Throughout the lesson I ask and invite questions and check student body language to assess understanding, and after the lesson I will use post-test questions to assess learning. If significant misunderstanding remains, then I can instantly revisit the concept and try another angle of explanation.
- **Student feedback:** Throughout each course, I aim to establish a learning environment where students feel comfortable providing feedback on my teaching methods relating to their learning needs. Although I do carefully read end-of-term student evaluations, I find that these comments are often too vague or late to allow me to make significant improvements. For this reason, I also add an (informal) mid-term student evaluation using a "plus-delta" technique I learned at a conference for early-career scholars in climate change (DISCCRS VI). I ask students to articulate "pluses" (strengths of the course and of my teaching methods) and "deltas" (constructive suggestions for elements of the course that could be improved to better meet learner needs). I elicit this feedback through an open group discussion (so I can clarify concerns and look for consensus or disagreement), but then also ask for anonymous comments to be submitted in writing. This technique allows me to adapt my teaching

methods during the course, and also provides me with guidance to inspire broader re-structuring of the course if necessary.

- **Participatory learning:** as much as possible, I attempt to engage students in the course topics and build skills through interactive activities. In smaller graduate courses I regularly facilitate discussions of readings and concepts. In my larger undergraduate lectures I put students into "interdisciplinary, persistent work teams" of four to five students, and then use iClicker questions to stimulate group discussion about controversial issues (e.g. cost-benefit analysis of the Northern Gateway pipeline in BC). Further discussion is facilitated by my teaching assistants in tutorials, including formal "debate" exercises (e.g. weak versus strong sustainability). I also use games or "simulation exercises" to reinforce course topics, such as supply and demand, cap-and-trade policy, and common pool resources—I find that such hands-on techniques help make theoretical concepts more intuitive for students, and increase the likelihood that they will internalize the concept (rather than just memorize a definition).
- **Critical thinking:** through many of the above techniques I aim to inspire students to develop more general skill of critical thinking. I ask them to challenge their pre-conceptions and to consider new topics, theories and ideas from the perspectives of different disciplines and stakeholders. I encourage students to discuss and constructively critique the validity of course concepts (not to just accept them), such as a particular economic theory (e.g. the rational actor model) or environmental policies (e.g. implementing a carbon tax). One of my stated learning outcomes is for students to learn to apply course concepts (and criticisms) to a variety of real-world applications beyond the course—effectively bringing those critical thinking skills into their careers and lives.
- **Multiple perspectives:** another learning outcome is for students to "develop collaborative, interdisciplinary learning and thinking skills." I encourage students to consider multiple viewpoints, including those views that may oppose their own. I often assign readings that debate a particular topic (e.g. "weak" versus "strong" sustainability) and then challenge students to understand both viewpoints (and potentially others) as part of articulating their own position. Interdisciplinary is further supported by my diversity of guest lecturers and team teaching, and by putting students into interdisciplinary discussion groups.

Context-specific teaching techniques

In addition to the general principles outlined above, I also work to customize my teaching techniques to fit a given group of learners for a particular topic. Specific techniques I may draw from include (much of which I've learned from teaching training workshops):

- **"Lab" exercises**: to build specialized skills, I design lab exercises to give students "hands-on" experience with a given method. For example, my graduate course in research methods for social and technical sustainability (REM-658) includes several labs to reinforce different methodological approaches (optimization modeling, simulation modeling, survey design and statistical analysis of empirical data). Students are given a real-world problem (and real data where possible) and instructed to answer a set of research questions by using the modeling approach. Student begin by working on their own, but then we work together to implement the technique, discuss results, and perhaps most importantly, to discuss drawbacks and limitations of our approach (and implications for any conclusions we make). I follow in modules on consumer survey design, where students design survey questions, test them with real respondents, and analyze this actual consumer data.

- **"Clickers"**: In my larger undergraduate lectures, I found it difficult to generate the dialogue and interaction that I think is necessary to effectively engage students and assess their needs. After attending training workshops and talking with other lecturers, I am now experimenting with iClickers in my undergraduate ecological economics course (REM-321). Each two-hour lecture includes three to five clicker questions which I use to assess student opinions (a poll of students' perspectives), to provide practice in applying a concept (to reinforce the lesson and check for understanding), or to quiz students (to incentivize and challenge students to keep up with readings and notes). I use many of the opinion or practice questions to facilitate small group discussions during lecture. Students then "vote" on an answer, and I then show students their response distribution, which I use to elicit further discussion of the agreement or dissent among students. I feel that my use of these iClickers has been successful from the beginning—the learning environment is much more engaging and participatory than it was in the previous year, and students have provided positive feedback regarding the small group discussions and being able to see the distribution of others' viewpoints.
- **Reflection exercises:** in some contexts I also use "formative assessment" methods that encourage student learning and reflection but don't account for a large portion of the final grade. In two of my courses, students must complete several "journal exercises" of less than 500 words to address questions on a particular course reading, concept or exercise. These exercises are graded as pass/fail, and the instructor and/or TA provides comments as needed. Student feedback to date indicates that these reflection exercises help to further reinforce key concepts, and provide space for student reflection in a "low-stakes" setting.
- **Team teaching:** because most of my teaching and research is interdisciplinary by design (e.g. ecological economics, energy modeling, transportation), I have explored methods of teaching particular concepts in an integrative fashion with my colleagues. I sometimes use guest speakers to expose students to alternate views on, say, fisheries management or climate change policy. I have also experimented with a more integrative, collaborative approach. For example, I have tried "team-teaching" a module on **ecosystem services** with an ecology professor in my department (Dr. Anne Salomon). For three 2-hour classes, we pooled our two distinct, but potentially complementary, graduate classes (ecological economics and applied population and community ecology). We worked together to cooperatively establish learning outcomes, readings and activities, seeking to introduce students to ecological and economic perspectives on ecosystem services, including issues of biodiversity, valuation techniques and management practices. I hope to further develop this approach for other contexts in the future, e.g. bringing together scholars with sociology, psychology and behavioural economics expertise to teach students about pro-environmental behaviour theory and research methods.

Teaching experience: Courses, training and committees

To date, I have experience teaching the following courses:

- **REM-658: Research Methods and Modeling for Social and Technical Sustainability (SFU, Spring 2012-15):** this is a 5-credit graduate course that trains students (8 to 12 students) to understand the foundational principles of several research methods relating to sustainable energy, including identification and comparison of the major types of research methods used to design and assess sustainability-oriented policy within energy and economic systems. The course includes lectures and guest lectures, seven "lab modeling exercises," four assignments, discussions of class readings, a midterm exam, student presentations, and a

term paper in modeling. The Spring 2014 syllabus and website are still posted at: https://sites.google.com/site/rem658spring2014/

- **REM-621: Ecological Economics (SFU, Fall 2012-14):** this is a 5-credit graduate course that is foundational to the REM Master's program (20 to 30 students). Students learn to critically evaluate the strengths and drawbacks of economic concepts of the environment, including applications to climate change, fisheries management and biodiversity loss. Tools include cost-benefit analysis, valuation of ecosystem services, and definitions and measures of sustainability. The course is based on lectures and class discussions of readings, four assignments (defining sustainability, calculating efficiency, cost-benefit analysis, and a critique of an economic journal article or report), and a midterm and final exam. The Fall 2014 syllabus and website are posted at: https://sites.google.com/site/rem621fall2014/
- **REM/ENV-321: Ecological Economics (SFU, Fall 2011-14):** this is 3-credit undergraduate course (50 to 60 students) that is based largely on the REM-621 graduate version. REM-321 covers slightly less material, at a slightly slower pace, and student learning outcomes are based on achieving a "media literacy" level of understanding of environmental issues and economic concepts. The Fall 2014 syllabus and website are posted at: https://sites.google.com/site/remenv321fall2014/home
- **ECI-163: Energy and Environmental Aspects of Transportation (UC Davis, Fall 2010)**: I co-taught this 3-credit undergraduate course with Professor Daniel Sperling (~100 students). We covered the scientific, technical and social aspects of transportation systems, with applications to air pollution and climate change problems in climate change. Students completed three short papers, a mid-term and final exam.

I have also completed several teacher training courses:

- **"Rethinking Teaching" Curriculum Design Workshop (SFU, 4 full days, April 26-May 1, 2012):** an interactive course that provided an introduction to learning outcomes and course design, and allowed faculty to design a course based on insights from education scholars. I have been invited to serve as a co-facilitator for the 2013 and 2014 versions of this workshop, which I did.
- **Instructional Skills Workshop or ISW (SFU, 3 full days, May 2-4, 2012):** attendees worked in small groups to practice their instructional skills, providing and receiving extensive feedback on daily instruction exercises (which were videotaped).
- **Collaborative Connections: Develop a Community of Learners in Your Classroom and Beyond" (UC Davis, six-part workshop, May-June, 2010):** a series of 2-hour sessions that provided tips and practice in building participatory learning experiences among students.

I also presently serve on three SFU committees relating to education:

- **Environmental Science Steering Committee (Spring 2013 to present):** this committee maintains and develops the Environmental Science undergraduate program at SFU.
- **REM Undergraduate curriculum committee (Fall 2011 to present):** this committee has just developed a Minor degree for the REM program at SFU (there currently are not yet any undergraduate majors in REM). We are developing program level learning outcomes, identifying existing undergrad courses, and proposing new courses that will be needed. This committee is also closely involved with the development of the new Bachelor's of Environment (BEnv) degree at SFU, which includes REM courses.

Student supervision

I am dedicated to providing a supportive, productive learning environment for the students that I supervise. I encourage my Master's and Ph.D. students to take on innovative, policy-relevant thesis and dissertation topics. I actively work to assess their interests, and provide guidance to assure that their final research product will be valid, publishable in a high-quality peer-reviewed journal, and useful for relevant stakeholders. I provide a high level of individual training to my students, as well as directing them to the expertise of other professors and researchers as needed. Where appropriate, I seek to bring in a "second reader" that may offer a different, complementary research background to myself. For example, I have had second readers that specialize in sociology (Dr. Rachael Shwom), media analysis (Dr. Alexandra Mallet), and modeling of electricity systems (Dr. Curran Crawford). My current supervisor duties are as follows:

Master's students (*4 graduated, 7 in progress*)

1. Brunner, Todd, Master's of Resource Management (M.R.M.), Fall 2014 to present, "Citizen acceptance of unconventional fossil fuel infrastructure in Canada."
2. Cairns, Josh, Master's of Resource Management (M.R.M.), Fall 2013 to present, "Plug-in electric vehicle buyers in British Columbia: Understanding motives and usage patterns." **Defense scheduled for August 2015**
3. Atherley, Dominque, Master's of Resource Management (M.R.M.), Fall 2013 to present, "Modeling the role of refueling infrastructure in alternative-fuel vehicle deployment: The case of EV chargers in British Columbia."
4. Lepitzki, Justin, Master's of Resource Management (M.R.M.), Fall 2013 to present, "Designing a low-carbon fuel standard for British Columbia: Insights from a hybrid energy-economy simulation model."
5. Langman, Brad, Master's of Resource Management (M.R.M.), Spring 2013 to present, "Understanding consumer demand for PEVs and green electricity using qualitative interviews." **Defense scheduled for August 2015**.
6. Sykes, Maxwell, Master's of Resource Management (M.R.M.), Fall 2012 to present, "Prioritizing plug-in vehicle policy strategies by Canadian region." **Defense scheduled for August 2015**
7. Peters, Derek, M.R.M., Fall 2012 to present, "Assessing 'smart grid' opportunities and barriers through media analysis." **Defended March, 2015**.
8. Kamiya, George, M.R.M., Fall 2011 to present, "Greenhouse gas impacts from plug-in vehicle use in Canadian regions: Comparing BC, Alberta and Ontario."
9. Moulé, Danette, M.R.M., Fall 2011 to present, "Exploring pro-environmental lifestyles and values in Canada." **Defended January, 2015**.
10. Mascarenhas, Karen, M.R.M., Fall 2011 to September 2014, "Public acceptance of carbon capture and storage in Alberta regions." **Defended September, 2014**.
11. Fox, Jacob, M.R.M, Spring 2011 to May 2013, "Comparing the societal costs of technologically-neutral and technologically-specific climate policies." **Defended May 2013**.

Undergraduate students (*1 graduated*)

1. Miele, Amy, Bachelor of Environmental Science, Honours thesis, Winter 2014, "Visibility of Electric Vehicle Charging Infrastructure: Is Awareness of Public Charging Stations Associated with Consumer Interest in Plug-in Electric Vehicle Purchase," Approved May 8, 2014.

Undergraduate research assistants (7 *presently active*)

1. Long, Zoe, Research assistant, January 2015 to present.
2. Salihue, Hafsa, Research assistant, January 2015 to present.
3. Cutler, Geoff, Research assistant, November 2014 to present.
4. Geeves, Kimberley, Research assistant, November 2014 to present.
5. Spira, Marta, Research assistant, November 2014 to present.
6. Roy-Wright, Gabe, Research assistant, March 2014 to present.
7. Miele, Amy, Research assistant, March-August 2014.
8. Agoes, Intan, Research assistant, March-August 2014.
9. Naghshinehpour-Esfahani, Negar, Research assistant, March-August 2014.
10. Dullemond, Kia, Research assistant, May 2013 to present.

Evidence of teaching effectiveness

Here I provide a summary of student evaluations and comments (from formal end-of-term evaluations, as well as my own "plus-delta" evaluation exercises). Table 1 below is a summary of my teaching experience and evaluations at SFU to date. Note in the most recent year (2014), I received the most positive evaluations for all three of my courses. On the following pages, for each course I provide several examples of positive student comments, as well as constructive criticisms (and how I addressed these criticisms).

Table 1: Summary of courses taught at SFU (2011-2015)

Course	Semester	Total student enrollment	Students' evaluation of course[a]		Students' evaluation of instructor[b]	
			Average rating (of 4.0)	% giving A or B	Average rating (of 4.0)	% giving A or B
REM-321 (undergrad)	2011-Fall	30	2.9	73%	2.8	73%
	2012-Fall	52	3.5	94%	3.6	92%
	2013-Fall	58	3.2	84%	3.5	89%
	2014-Fall	**60**	**3.7**	**98%**	**3.8**	**97%**
REM-621 (grad)	2012-Fall	25	3.6	100%	3.7	96%
	2013-Fall	30	3.5	92%	3.4	88%
	2014-Fall	**24**	**3.6**	**100%**	**3.8**	**100%**
REM-658 (grad)	2012-Spring	12	3.8	100%	3.8	92%
	2013-Spring	9	3.8	100%	3.6	89%
	2014-Spring	11	3.9	100%	3.8	100%
	2015-Spring	**7**	**3.7**	**100%**	**4.0**	**100%**

[a] Question is "I would rate this course as: A, B, C, D or F" (circle one)
[b] Question is "I would rate this instructor's teaching ability as: A, B, C, D or F" (circle one)

REM-321 (Fall 201l-14): Ecological Economics

Selection of "Plus" comments (Strengths, from 2012)

- "Great lectures, very enthusiastic."
- "It is a really useful course, I think I learned a lot."
- "Jonn is a good instructor and the assignments were well-related to the real world."
- "Everything seemed fair in this class and I would recommend it to others."
- "I think you are an excellent instructor. You're course was very well done. I enjoyed your lectures and never had the urge to leave early or skip (despite being on campus for 12 hours on Wednesdays). I spoke to you early in the semester and mentioned I enjoyed the games in tutorials. It was nice to see a different perspective put on material I've learned before."

Selection of "Delta" comments (Suggestions for improvement, from 2012)

Student comment	**My action for improvement**
• "Many graphs could have been gone over more clearly for non-economic students".	• I have since worked through many of my lecture slides to simplify where possible, and I have identified sections that require more careful explanations.
• "I was not expecting so much neo-classical economics and was a bit disappointed because of that."	• I have now re-oriented the course to more carefully explain the differences between neo-classical and ecological economics, and I provide more readings, assignments, and discussion questions that provide greater depth in ecological concepts.

REM-658 (Spring 2012-15): Research Methods for Social and Technical Sustainability

Selection of "Plus" comments (Strengths, from 2012)

- "Very knowledgeable, open to other views/opinions"
- "Knowledgeable, good listening skills"
- "Excellent teacher, well organized coursework, prof is very approachable, answers questions & makes students feel comfortable with sharing opinions"
- "He worked very hard to help us understand the complex materials. The assignments and reading were well thought out and complemented the course well. One of the best courses I have taken"
- "Strengths: ease, humour, enthusiasm"
- "Great hands-on exercises"

Selection of "Delta" comments (Suggestions for improvement, from 2012)

Student comment	**My action for improvement**
• "Models could have been clearer at times, especially when assignments based on those models was required. Things could have been explained more at times."	• In 2013, I identified the few modeling concepts that were most confusing for students. I explained these concepts more carefully, and add more explanation and discussion to these sections of lab assignments.
• "For group discussions maybe send questions in advance, facilitate discussion by paraphrasing responses and summarizing the discussion at the end"	• In 2013, I used the "reading guide" questions style that I have already found useful in REM-621 and 321 to help prioritize student focus. I also used these reading questions to better facilitate discussions.
• "Could improve teaching methods (e.g. break students into groups for discussions to improve engagement)"	• Rather than facilitate all discussion at the full class level (~10 to 12 students), in 2013 I provided more opportunities for small group discussions (3-4 students) to allow for more participative discussion and reflections (before going into large group discussion).

REM-621 (Fall 2012-14): Ecological Economics

Selection of "Plus" comments (Strengths, from 2012)

- "I like your slides -- not too much details, but just enough, and it makes the readings needed (and relevant) to complete the info for ourselves. The learning outcomes are great, very useful (almost too much -- made studying for the exam almost too easy!). I am new to economics and I feel like I've learnt a lot, explanations are clear, material provided too, readings relevant. Great job!"
- "In general, I really appreciate the space you leave for class participation and discussion."
- "The guiding questions for the reading are very useful in getting to the valuable aspects of the reading and supporting the learning outcomes"
- "Economics games: always relevant and really do help me with understanding concepts in economics"
- "I feel like exactly the right amount/difficultly/level of economics is being taught for the program. For someone who knew absolutely nothing about economics at the beginning of the course, I can say I have a good grasp on these major concepts and can follow discussions on the news, etc., but I am not learning so many concepts and being provided with so much information that I'm overwhelmed or feel like the content is irrelevant to me"
- "I really like the class atmosphere you create. All questions seem equitable, and you answer them to the best of your abilities every time. You also keep the room fun, and encourage group work, which I know all of us benefit from. I find the in class group activities to be very helpful in learning the objectives."

Selection of "Delta" comments (Suggestions for improvement, from 2012)

Student comment	**My action for improvement**
• "Team teaching was great, but I would have preferred maybe more discussion and critiques."	• Students general agreed that they would have liked to see more interaction between me and my co-lecturer in our "team taught" module. We will actively work to improve this interaction for future iterations.
• "The WW [Weekly Writing] assignments feel too frequent, particularly because it is only 400 words about our opinions on a topic. I advocate more/longer assignments in the place of WW exercises. "	• As a compromise (students did not all agree), I allowed students to submit only 4 rather than 10 weekly writing exercises. For next year, I may keep this lower constraint, and re-word weekly topics to inspire more depth in analysis.
• "I would appreciate sometimes if you would go slower on key concepts and provide more examples."	• I continue to work on pacing myself for particularly complex and important concepts. Though, in some cases I need to move on, and must refer a few students to office hours or an extra study review session.