

ACKNOWLEDGEMENT

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xwməθkwəyəm (Musqueam) people. The land it is situated on has always been a place of learning for the Musqueam people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

COURSE INFORMATION

Course Title	Course Code Number	Days and Time	Credit Value
Exploring Solutions to Climate Change: Government Policy and Private Markets.	FRE 526	MW, 10-11:30	1.5

DESCRIPTION

The United Nations terms Climate Change as the defining issue of our time. In this course, we will help you understand the economic and financial solutions to the problem of climate change. Using a canonical model, we will define society's optimal emission of greenhouse gases (GHGs), and the principle underlying a cost-effective policy to achieve it. We will evaluate (theoretically and in practice) two commonly employed GHG reduction policies: carbon taxes and cap and trade; discuss the state of the world's climate policies; and evaluate the landscape for climate solutions through private financial markets.

PREREQUISITES

MFRE courses required in your first semester, or permission of the instructor.

COURSE INSTRUCTORS

Course Instructor(s)	Contact Details	Office Location	Office Hours
Sumeet Gulati	+1 (604) 822-2144, sumeet.gulati@ubc.ca .	MCML 341	Wed, 11:30 AM – 12:30 PM.
Vikram Raju	Vikram.Raju@morganstanley.com	MCML 3XX	TBA

Sumeet is a Professor in Environmental and Resource Economics at the University of British Columbia. Among other things, he studies the cost of conflict with wildlife to farmers living in proximity of wildlife reserves in India. This includes direct damages from conflict: lost crops and livestock, human injury and death. His projects in the economics of conservation are listed at [the Wildlife and Conservation Economics Laboratory](#).

Vikram is a Managing Director at Morgan Stanley and the Head of Climate Investing for Private Markets at Morgan Stanley Investment Management. Previously he was the Climate Funds Lead at the IFC/World Bank Group.

TEACHING ASSISTANT.

Course Assistant(s)	Contact Details	Office Location	Office Hours
Juan Fercovic	juan.fercovic@ubc.ca .	Zoom	Tuesday 3:30-4:30 pm

I am a Ph.D. student at [the Wildlife and Conservation Economics Laboratory](#) studying the factors determining energy consumption and its components by households in Canada and Chile.

COURSE STRUCTURE

In this course you will attend lectures, read assigned material, and evaluate (and devise in one case) solutions to climate change. Assignments and exams, play an important part in the learning of the topics presented.

SCHEDULE OF TOPICS

Wherever possible we provide a stable link to the paper. While some of these links will work anywhere, many of them are digitally protected requiring a subscription. You can access this material by logging in through your account at the UBC library, or on any computer connected via Ethernet on the UBC network. For some articles I do not provide a link, in that case, please search for the article (if you search via the UBC library you will find access to its electronic version).

This outline is subject to change. We might add/replace material as the course proceeds.

1) Introduction to Environmental Economics:

- a) There is course material on Canvas for this section, please review your course slides up to and including the set of slides titled: dynamic efficiency. Students can supplement the material on Canvas by reading an undergraduate level environmental textbook of their choice. One suggestion is: Keohane and Olmstead, *"Markets and the Environment,"* Island Press, <http://www.islandpress.com/ip/books/book/islandpress/M/bo5092233.html>:
 - i) Economic Efficiency.
 - ii) Externalities and Market Failure.
 - iii) Benefit-cost analysis and its relationship with efficiency.
 - iv) Dynamic/Intertemporal Efficiency.
- b) The economics of pollution control / Instrument choice in environmental policy.
 - i) Material in Canvas: course slides titled "The Economics of Pollution Control" and "Ambient Standards."
 - ii) Lawrence H. Goulder and Ian W. H. Parry (2008), "Instrument Choice in Environmental Policy," *Rev Environ Econ Policy* 2(2): 152-174 doi:10.1093/reep/ren005. Available online at <http://reep.oxfordjournals.org/content/2/2/152.abstract>.

2) The Economics of Climate Change.

- a) Material in Canvas: course slides titled: "The economics of climate change: An introduction."
- b) Material in Canvas: course slides titled: "Carbon Taxes vs. Cap and Trade."
- c) The choice of social discount rates in climate policy.
 - i) Material in Canvas: course slides titled "Discounting for Climate Change."
 - ii) Maureen Cropper in the RFF Resources Magazine. <https://www.resourcesmag.org/archives/how-should-benefits-and-costs-be-discounted-in-an-intergenerational-context/>.
 - iii) David Roberts on Grist: <https://grist.org/article/discount-rates-a-boring-thing-you-should-know-about-with-otters/>.
 - iv) Goulder and Williams, RFF working paper: <https://www.rff.org/publications/working-papers/the-choice-of-discount-rate-for-climate-change-policy-evaluation/>.
- d) Economic Justice and Carbon Policy.
 - i) Hernandez-Cortes, D., & Meng, K. C. (2023). Do environmental markets cause environmental injustice? Evidence from California's carbon market. *Journal of Public Economics*, 217, 104786.

3) Climate Investment:

- a) The recent history of Climate investing, the current climate investment landscape and the continued role of public and philanthropic capital in three scenarios: Subsidy, hybrid and market
- b) Institutional responses: Net Zero, Regulation, Divest, decarbonise and solutions
- c) Climate Solutions across asset classes: Fixed Income and Equity, Public and Private
- d) Impact creation and Impact measurement
- e) Deep dive on Private Equity climate solutions using cases

Suggested readings for section:

- i) <https://www.morganstanley.com/im/en-us/individual-investor/insights/articles/sustainable-investing-myths-debunked.html>
- ii) <https://www.morganstanley.com/im/en-us/individual-investor/insights/articles/you-are-not-doing-esg-investing.html>
- iii) <https://www.ipe.com/special-reports/long-term-investors-absolutely-cannot-afford-to-function-without-a-climate-lens-and-why-that-may-not-be-enough/10056039.article>
- iv) Gates, B. (2021). How to avoid a climate disaster: The solutions we have and the breakthroughs we need (First ed.). Alfred A. Knopf. Chapter 6.

4) Energy Transition (depending on time available):

- a) The Challenge.
 - i) Hoffert, M. I. (2010). Farewell to fossil fuels?. *Science*, 329(5997), 1292-1294.
 - ii) Grubert, E., & Hastings-Simon, S. (2022). Designing the mid-transition: A review of medium-term challenges for coordinated decarbonization in the United States. *WIREs Climate Change*, 13(3), e768. <https://doi.org/10.1002/wcc.768>.
- b) The promise of falling costs of renewable energy.
 - i) Way, R., Ives, M. C., Mealy, P., & Farmer, J. D. (2022). Empirically grounded technology forecasts and the energy transition. *Joule*, 6(9), 2057-2082.
 - ii) David Roberts, Volt Podcast: <https://www.volts.wtf/p/learning-curves-will-lead-to-extremely#details>.
 - iii) Nemet, G. F. (2019). How solar energy became cheap: A model for low-carbon innovation (1st ed.). Routledge. <https://doi.org/10.4324/9780367136604>. Parts 2 and 3.
- c) Scarcity vs Extraction Costs and their role in energy transition.
 - i) Covert, T., Greenstone, M., & Knittel, C. R. (2016). Will we ever stop using fossil fuels?. *Journal of Economic Perspectives*, 30(1), 117-38.
- d) Comparing the cost effectiveness of policies reducing greenhouse gas emissions.
 - i) Gillingham, Kenneth, and James H. Stock. (2018). "The Cost of Reducing Greenhouse Gas Emissions." *Journal of Economic Perspectives*, 32 (4): 53-72. DOI: 10.1257/jep.32.4.53.

LEARNING OUTCOMES

Through this course we will help you,

- To understand the basic economic principle of cost minimization that allows one to lower the costs for meeting environmental goals in a society of heterogenous actors.

- To determine the relative merits of different environmental policies—market-based or other regulatory solutions—in climate change policy.
- To evaluate the role of discount rates in setting climate targets.
- To understand the potential (and limits) of private investment in climate action.
 - And to get a perspective on the evolution of climate investing and get some familiarity with trends in regulation and capital allocation.

LEARNING ACTIVITIES

Preparation for lectures.

Active participation in class.

Assignments, and tests.

LEARNING MATERIALS

Available at Canvas: <http://www.canvas.ubc.ca>. You are required to regularly login to your course page for FRE 526. Your syllabus, course-lecture slides, additional material, announcements, assignments, and grades will be available there.

Students can supplement the material on Canvas by reading an undergraduate level environmental textbook of their choice. One suggestion is: Keohane and Olmstead, “Markets and the Environment,” Island Press, <http://www.islandpress.com/ip/books/book/islandpress/M/bo5092233.html>.

ASSESSMENTS OF LEARNING

Your grade shall be determined as follows

Exams and Problem Sets	Date	Percent of Grade
2 take-home theory assignments.	Assigned every two weeks.	30 percent
Group Investment Proposition	Assigned at the start of class.	Total: 30 percent
First Submission	Due Jan 30 th .	10 percent
Final Submission	Due Last day of class.	20 percent
Final Exam	In Class, date and time TBA.	30 percent
Class Participation	See below.	10 percent

Assignments

You will be assigned three take-home assignments consisting of problem sets and short essays addressing what you have learnt in class and from your assigned readings. These assignments will challenge students to understand the economic impacts of various market failures in real-world environmental situations, the relative merits of different environmental policies - market-based or other regulatory solutions - in different contexts as well as the critical role of property rights, institutions, and incentives in addressing environmental problems.

Exam

The final exam will be comprehensive (it shall cover all material taught in class), will be held in-person (the time and room will be announced early February), and will last two hours. As long as the university permits, we will hold this exam in person. If public health/university regulations require the exam to be taken online, we will inform you about this change as soon as possible.

Class Participation

Your participation grade depends on your contribution to class discussions. All contribution is appreciated, even questions asking me to clarify previously taught material. The sole aim of assigning a participation grade is to encourage active learning for everyone.

Formally, participation will have two assessments.

First, every two weeks you will submit on canvas a short reflection of the what you learnt in class in the previous fortnight. While writing this reflection you are required to relate something you learnt in class to the world around you. You can relate a topic from class something you read in the news, or something you experienced in life. The possibilities are up to you. The reflection cannot exceed 400 words, but can be shorter. If the reflection makes sense, it will be assigned a 2 participation points, if submitted but hard to understand, it will get 1 participation point, and if not submitted will earn 0. There will be a recurring assignment on canvas for you submit this reflection.

Second, you will keep note of your individual participation during class, making a note of every time you ask a question, answer a question I ask, or contribute to the class discussion using the chat button on our online learning platform. These participation logs will also be submitted every two weeks (using the same assignment on Canvas). This participation will also be capped to 2 points per week.

UNIVERSITY POLICIES

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.

Details of the policies and how to access support are available on [the UBC Senate website](#).

Academic Accommodation for Students

The University accommodates students with disabilities who have registered with the Disability Resource Centre. The University also accommodates students whose religious obligations conflict with attendance or scheduled tests or exams. Other absences for varsity athletics, family obligations or other similar commitments are not part of University policy and students should not assume that they would be accommodated. Academic accommodations help students with a disability or ongoing medical condition overcome challenges that may affect their academic success. Students requiring academic accommodations must register with Access & Diversity. A&D will determine that student's eligibility for accommodations in accordance with Policy 73: Academic Accommodation for Students with Disabilities. Your instructors do not determine academic accommodations, however, your instructor may consult with Access and Diversity should the accommodations affect the essential learning outcomes of a course. If you have a pressing issue those conflicts with an exam, you should discuss this with your instructor as soon as possible. Refer to the UBC Calendar for details of 'academic concession'.

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity.

At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work.

Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

For International Students - Issue of controversial topics in online learning

During this pandemic, the shift to online learning has greatly altered teaching and studying at UBC, including changes to health and safety considerations. Keep in mind that some UBC courses might cover topics that are censored or considered illegal by non-Canadian governments. This may include, but is not limited to, human rights, representative government, defamation, obscenity, gender or sexuality, and historical or current geopolitical controversies. If you are a student living abroad, you will be subject to the laws of your local jurisdiction, and your local authorities might limit your access to course material or take punitive action against you. UBC is strongly committed to academic freedom, but has no control over foreign authorities (please visit <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,33,86,0> for an articulation of the values of the University conveyed in the Senate Statement on Academic Freedom).

Thus, we recognize that students will have legitimate reason to exercise caution in studying certain subjects. If you have concerns regarding your personal situation, consider postponing taking a course with manifest risks, until you are back on campus or reach out to your academic advisor to find substitute courses. For further information and support, please visit: <http://academic.ubc.ca/supportresources/freedom-expression>

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All class sessions will be recorded and posted on Canvas for the use of those in class.

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