

### COURSE INFORMATION

Course title:	Climate Economics and Markets		
Course code:	BAPA580A	Credits:	1.5
Session and term:	2023W2 Term 2	Class location:	Henry Angus 133
Section(s):		Class times:	Mon Wed 16:00 – 18:00
Course duration:	Jan 08, 2024 to Feb 07, 2024	Pre-requisites:	n/a
Division:	Strategy and Business Econ	Co-requisites:	n/a

### INSTRUCTOR INFORMATION

Instructor:	Guillermo Marshall		
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### COURSE DESCRIPTION

Climate change is the defining global challenge of the 21st century. Climate change requires businesses, households, and governments to respond to this challenge through mitigation of carbon emissions and adaptation to a changing environment. Governments are developing a multitude of economic policy interventions to facilitate mitigation and adaptation, and businesses are responding by reducing their carbon footprint but also by developing new solutions. Climate change has also created novel markets for climate solutions through innovation. Renewable energy sources are first among them, as displacing fossil fuels is critical for achieving climate action goals. Decarbonization across the many sectors of the economy poses numerous additional challenges and obstacles---as well as new market opportunities.

This course explores how economic principles shape environmental policy and market solutions for climate change. The course will answer the question: How do specific businesses (from small local firms to large multinational corporations) develop strategies and adapt their business models in a world characterized by climate change?

This course is intended to prepare MBA students for a business environment in which climate change considerations are ever present: in responding to government policies or managing climate risk, location choice, supply-chain resilience, and emerging technologies and markets.

### COURSE FORMAT

This course offers a blend of lectures, in-class discussions, group activities, and case studies of particular companies and climate solutions. It may also feature guest speakers on occasion. Students will do readings outside of classroom time. There will also be a group-based project to be completed outside of class time.

### LEARNING OBJECTIVES






By the end of this course, students will be able to:

- 1) Identify the specific economic effects of climate change on businesses and households, and the heterogeneity of effects across regions and countries.
- 2) Understand principles of economic policy applied to climate change---in particular the differences between voluntary, mandated, and market-based approaches---and describe the different effects of emissions taxes, emission permit trading, subsidies, and hybrid policy instruments.

- 3) Acquire specific economic decision-making tools such as cost-benefit analysis.
- 4) Learn about climate solutions in emission-intensive industrial sectors (e.g., oil & gas production, steel, cement) as well as households (heating, cooling).
- 5) Engage effectively in rigorous science-based discussions about environmental policy pertaining to climate change.

**SUSTAINABLE DEVELOPMENT GOALS (SDGS)**

At UBC Sauder, we are committed to responsible business practices that can have transformative impacts on society. One of the ways we are reinforcing our commitment to responsible business is by showcasing relevant content in our courses via the lens of the [United Nations Sustainable Development Goals](#). In this course, we will touch on topics that relate to the following goals:

<p><b>Goal 7: Affordable and Clean Energy</b></p> 	<p><i>Ensure access to affordable, reliable, sustainable and modern energy for all</i></p> <p><b>Concepts and ideas discussed in the course:</b> access to clean energy, renewable energy, energy conservation, fossil fuel divestment.</p>
<p><b>Goal 9: Industry, Innovation and Infrastructure</b></p> 	<p><i>Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</i></p> <p><b>Concepts and ideas discussed in the course:</b> innovation, research and technology, entrepreneurship.</p>
<p><b>Goal 12: Responsible Consumption and Production</b></p> 	<p><i>Ensure sustainable consumption and production patterns</i></p> <p><b>Concepts and ideas discussed in the course:</b> low emission supply chain design.</p>
<p><b>Goal 13: Climate Action</b></p> 	<p><i>Take urgent action to combat climate change and its impacts</i></p> <p><b>Concepts and ideas discussed in the course:</b> natural disaster response, climate change mitigation, climate change adaptation, climate policy, environmental externalities, low emission supply chain design, Environmental Disclosure, Cap and Trade, Carbon Markets, Carbon Pricing.</p>
<p><b>Goal 17: Partnerships for the goals</b></p> 	<p><i>Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development</i></p> <p><b>Concepts and ideas discussed in the course:</b> international cooperation, trade, taxes, collective action</p>

## ASSESSMENTS

### Summary

<u>Component</u>	<u>Weight</u>
Short Assignments	5%
Quiz	10%
Group project	30%
Final exam	35%
Class participation	<u>20%</u>
Total	<u>100%</u>

### Details of Assessments

#### **Short Assignments (5%)**

For each case that we will discuss in class, there will be a short assignment posted on Canvas. Their main goal is to help you direct your efforts in to the right track and prepare you for an active class discussion.

Assignments are submitted online and are due by 9:00 AM on the day of the class in which a case is discussed, independently of whether you are attending that class or not. Late assignments will not be accepted. Each student is expected to hand in his or her own assignment, although you can certainly discuss the assignment in groups. Each assignment is worth the same and will be graded mark or no mark.

#### **Team Project: Climate Strategy Report (30%)**

A self-directed team project is part of this course. Depending on class size, students will form 4--7 teams of 3--5 students in order to research and prepare a presentation. Student teams will be assigned randomly through Canvas.

Each team is required to write an essay about the climate strategy of a business (see list below for some suggestions about Canadian companies). The objective of the essay is to identify the following elements of the firm's climate strategy, and provide brief and succinct assessments of:

- the 'carbon footprint' of the business (over time, in context);
- the carbon initiatives that the business has taken so far;
- the further technological choices for decarbonization (reducing CO2 emissions);
- an analysis of the economic challenges of the business implementing carbon solutions, in response to government policies as well as market presence and upstream & downstream effects.

This assignment should be about 3-4 pages long (maximum 2,000 words), not including any tables, figures, or bibliographic citations (as applicable). It should be concise and well-structured.

Aside from the report, each team will deliver an in-class presentation no longer than 12 minutes each, allowing for a few minutes for follow-up questions.

Some Canadian companies to consider, focusing on their most CO2 intensive plants and locations:

- Algoma (Sault Ste. Marie, Ontario) -- Steel Mill
- ArcelorMittal Dofasco (Hamilton, Ontario) -- Steel Mill
- Irving (Saint John, New Brunswick) -- Oil Refining
- Lafarge (Richmond, B.C.) -- Cement Plant
- Nova Chemicals (Joffre, Alberta) -- Ethylene/Polyethelene Plant
- Port of Vancouver (B.C.) -- Marine Cargo Terminal
- Rio Tinto Alcan (Kitimat, B.C.) -- Aluminium Smelter
- SaskPower (Estevan, Saskatchewan) -- Coal Power Generation
- Suncor (Alberta) -- Oil & Bitumen Upgrading
- Translink (Metro Vancouver) -- Urban Transportation

Essays and presentations will be graded on four rubrics, equally weighted:

- Ability to draw on business intelligence (data and sources)
- Exploring all relevant dimensions of the company's climate strategy (scope)
- Ability to apply economic concepts and reasoning (rigour)
- Efficacy of communication & writing (style).

### **Final Exam (35%) + Quiz (10%)**

A 90-minute final exam will be held during the final week of the module period. The final will be comprised of a combination of multiple-choice questions and short-essay questions. The quiz will be in class on January 29.

### **Participation (20%)**

It is important to attend all sessions and fully engage in classroom discussions of the pertinent topics. Please keep your class notes up-to-date. In order to prepare for discussions in class, students must read the assigned articles and cases.

### **LEARNING MATERIALS**

Required:

- i) News articles posted on the *Library Online Course Reserve on Canvas*.
- ii) Cases: There is a required case packet which can be purchased online at Ivey. Detailed instructions are posted on Canvas.

Additional materials recommended but not required:

- i) Textbook: "Markets and the Environment" (Second Edition) by Nathaniel Keohane and Sheila Olmstead. Free download available from the UBC Library.

### **COURSE-SPECIFIC POLICIES AND RESOURCES**

*Missed or late assignments, and regrading of assessments*

Late submissions will not be accepted and will receive a grade of zero.

### *Academic Concessions*

If extenuating circumstances arise, please contact the RHL Graduate School program office as early as reasonably possible, and submit an [Academic Concession Request & Declaration Form](#). If an academic

concession is granted during the course, the student will be provided options by RHL, or by the instructor in consultation with RHL, per [UBC's policy on Academic Concession](#).

### *Code Plagiarism*

Code plagiarism falls under the UBC policy for [Academic Misconduct](#). Students must correctly cite any code that has been authored by someone else or by the student themselves for other assignments.

Cases of "reuse" may include, but are not limited to:

- the reproduction (copying and pasting) of code with none or minimal reformatting (e.g., changing the name of the variables)
- the translation of an algorithm or a script from a language to another
- the generation of code by automatic code-generations software

An "adequate acknowledgement" requires a detailed identification of the (parts of the) code reused and a full citation of the original source code that has been reused.

Students are responsible for ensuring that any work submitted does not constitute plagiarism. Students who are in any doubt as to what constitutes plagiarism should consult their instructor before handing in any assignments.

## **POLICIES APPLICABLE TO COURSES IN THE ROBERT H. LEE GRADUATE SCHOOL**

### *Attendance*

Excepting extenuating circumstances, students are expected to attend 100% of their scheduled class hours. Absent students limit their own academic potential, and that of their classmates, and cause unnecessary disruption to the learning environment. Students missing more than 20% of the total scheduled class hours for a course (including classes held during the add/drop period) without having received an academic concession will be withdrawn from that course. Withdrawals, depending on timing, could result in a "W" or an "F" standing on the transcript.

### *Punctuality*

Students are expected to arrive for classes and activities on time and fully prepared to engage. Late arrivals may be refused entry at the discretion of the instructor or activity lead. Students arriving later than halfway through a scheduled class will be treated as absent for that class.

### *Electronic Devices*

Devices such as laptops, tablets, and cell phones are not permitted to be used in class unless directed by the instructor for in-class activities. Students who do not follow the School's policy in this regard may be required to leave the room for the remainder of the class, so that they do not distract others. Research shows that students' use of laptops in class has negative implications for the learning environment, including reducing their own grades and the grades of those sitting around them.

### *Citation Style*

Please use the American Psychological Association (APA) reference style to cite your sources.

Details of the above policies and other RHL Policies are available at:

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,199,506,1625>

## UNIVERSITY POLICIES AND RESOURCES

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 at <https://senate.ubc.ca/policies-resources-support-student-success>.

### *Respect for Equity, Diversity, and Inclusion*

The UBC Sauder School of Business strives to promote an intellectual community that is enhanced by diversity along various dimensions including Indigeneity (including identification as First Nation, Métis, or Inuit), race, ethnicity, gender identity, sexual orientation, religion, political beliefs, social class, and/or disability. It is critical that students from diverse backgrounds and perspectives be valued in and well-served by their courses. Furthermore, the diversity that students bring to the classroom should be viewed as a resource, benefit, and source of strength for your learning experience. It is expected that all students and members of our community conduct themselves with empathy and respect for others.

### *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.

### *Use of Artificial Intelligence*

For this course, students may use generative artificial intelligence (AI), including ChatGPT, for specific assessments or coursework, where it is expressly specified by the instructor. In these cases of permitted use, students must disclose any use of AI-generated material as per the assessment guidelines.

## COPYRIGHT

All materials of this course (course handouts, lecture slides, assessments, course readings, etc.) are the intellectual property of the instructor or licensed to be used in this course by the copyright owner. Redistribution of these materials by any means without permission of the copyright holder(s) constitutes a breach of copyright and may lead to academic discipline and could be subject to legal action. Any lecture recordings are for the sole use of the instructor and students enrolled in the class. In no case may the lecture recording or part of the recording be used by students for any other purpose,

either personal or commercial. Further, audio or video recording of classes are not permitted without the prior consent of the instructor.

### ACKNOWLEDGEMENT

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the x̣ṃəθḳẉəỵəm (Musqueam) people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

### COURSE SCHEDULE

(Subject to change)

#### **Lecture 1 (Jan 8):** Introduction and the basics of climate change

- 1) "Revealed: Exxon made 'breathtakingly' accurate climate predictions in 1970s and 80s", *The Guardian*, January 12, 2023
- 2) Case: Global Carbon Emissions: An Interactive Illustration (see case packet)

#### **Lecture 2 (Jan 10):** Efficiency and cost--benefit analysis

- 1) "Are 'Heat Pumps' the Answer to Heat Waves? Some Cities Think So.", *The New York Times*, June 30, 2021
- 2) "Climate fight enters kitchens as restaurants ponder switch from gas stoves to induction cooktops", *The Globe and Mail*, June 22, 2023
- 3) "You've Never Heard of Him, but He's Remaking the Pollution Fight", *The New York Times*, May 28, 2023
- 4) Keohane and Olmstead textbook -- Chapters 2 and 3 (optional)

#### **Lecture 3 (Jan 15):** Cost and benefit analysis within the firm

- 1) "Inside UPS's Electric Vehicle Strategy", *Harvard Business Review*, March 29, 2018 (see case packet)
- 2) "Patagonia's Founder Is America's Most Unlikely Business Guru", *The Wall Street Journal*, April 26, 2012
- 3) "Apple Urges Its Suppliers to Decarbonize Manufacturing", *The Wall Street Journal*, October 26, 2022

<https://www.wsj.com/articles/apple-urges-its-suppliers-to-decarbonize-manufacturing-11666798877>

- 4) "Walmart Makes Progress on Emissions Target By Winning Over Suppliers, CSO Says", *The Wall Street Journal*, April 12, 2022.

#### **Lecture 4 (Jan 17):** Markets and externalities

- 1) "Japan Begins Releasing Treated Radioactive Water at Fukushima", *The New York Times*, August 24, 2023
- 2) "Palm Oil Was Supposed to Help Save the Planet. Instead It Unleashed a Catastrophe.", *The New York Times*, November 20, 2018.
- 3) Keohane and Olmstead textbook -- Chapters 4 and 5 (optional)

**Lecture 5 (Jan 22):** Market-based policy instruments and regulation

- 1) "What does the perfect carbon price look like?", *The Economist*, June 1, 2023
- 2) "Emissions Loophole Stays Open in E.U.", *The New York Times*, November 8, 2014
- 3) "Is the carbon tax worth fighting for?", *The Globe and Mail*, November 4, 2023
- 4) Keohane and Olmstead textbook -- Chapter 8 (optional)

**Lecture 6 (Jan 24):** Market-based policy instruments and regulation II

- 1) Case: Ontario Cap and trade (see case packet)

**Lecture 7 (Jan 29):** Climate change and insurance markets

**In class Quiz**

- 1) "Changing weather could put insurance firms out of business", *The Economist*, September 19, 2019
- 2) "Climate change is coming for America's property market", *The Economist*, September 21, 2023
- 3) "Climate Shocks Are Making Parts of America Uninsurable. It Just Got Worse.", *The New York Times*, May 31, 2023
- 4) "Climate change may mean 'hundreds of billions' at risk in U.S. housing market", *The Globe and Mail*, September 20, 2023.
- 5) "Insurer Spurs Companies to Mitigate Climate-Related Risks", *The Wall Street Journal*, August 7, 2022
- 6) "How an Insurer Helps a Shipper Stay Above Water", *The Wall Street Journal*, June 2, 2023

**Lecture 8 (Jan 31):** Innovation and the business of achieving net-zero I: Carbon capture

- 1) Case: Carbon Engineering (see case packet)
- 2) "Can carbon removal become a trillion-dollar business?", *The Economist*, May 21, 2023

**Lecture 9 (Feb 5):** Innovation and the business of achieving net-zero I: Transportation

- 1) Case: Northvolt: Making the world's greenest battery (see case packet)
- 2) "Li-Cycle, the Canadian company at the forefront of EV battery recycling, readies for its big test", *The Globe and Mail*, June 30, 2023
- 3) "Airlines Push to Reduce Carbon Footprint With Greener Fuels", *The Wall Street Journal*, February 9, 2021

**Lecture 10 (Feb 7):** In-class presentations