

## **SUMA K4175 Global Environmental Markets**

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### **Course Description**

Increased awareness of environmental issues has resulted in an evolving convergence between capital markets and the environment, giving rise to a growing environmental finance and trading market. At the same time, more companies and institutions have acknowledged the complexities inherent in managing their exposure to these markets and are choosing to participate by more fully understanding their inherent risks and opportunities.

The concept of utilizing financial markets to address environmental challenges is not new, however it offers one of the most promising solutions to many of the world's most pressing environmental issues including, climate change, deforestation, acid rain, biodiversity and water. Environmental markets utilize transferable permits to control pollution, and have evolved from a little known policy tool to a broadly applied international program to address the largest global environmental challenges.

The course will examine the theory and practice of environmental markets and will consider why and how emissions can now be traded. Climate change, carbon markets and the international agreements that underpin carbon markets will be discussed. The class will also look at the role of the public sector, including various U.N. agencies, multilaterals such as the World Bank, and the relevant United States regulatory agencies including the Environmental Protection Agency, as well as the crucial role played by the private sector. The course will also examine markets for ecosystem services and other environmental markets including those for renewable energy and the US acid rain program. The course will end with a look to the future, to the role of the developing world, to the direction that international negotiations are heading and to programs such as avoided deforestation (REDD).

### **Course Objectives**

The learning objectives of this course are designed to provide the sustainability professional with an understanding of macro-trends driving the convergence between environmental science, policy and capital markets. The course is designed to: (i) survey the largest and most significant environmental markets implemented (or proposed), (ii) provide a set of fundamental skills that students may apply to their professional lives to engage with environmental markets, or indeed with markets of any kind, and (iii) develop an analytical framework for approaching environmental market activities (whether projects, policies or business initiatives).

The class will be informed by the application of environmental markets, and as such will include several guest lecturers who are active practitioners in environmental markets. The course will focus principally on exploring the application of markets to address global climate change and the resultant carbon markets.

Upon completing this class, students should be able to effectively answer the following questions:

- What are ecosystem services and how are they valued?
- When and how can markets be used to address environmental and sustainability challenges?
- What are the advantages and disadvantages of using markets versus the application of taxes or command and control measures?
- Are markets an effective tool to address environmental issues? What are the benefits and challenges

to applying capital markets as a mitigation strategy?

- Can environmental markets effectively mobilize and catalyze the private sector and more specifically private capital?
- What is the role of environmental markets in the global economy?
- What are the key technical, political, economic and organizational challenges to the implementation of these markets?

### **Course Format**

The course will be taught through a mix of lectures, class discussions, in-class exercises, and visiting speakers with expertise and experience in the areas covered in the course. Active student participation in class will be strongly encouraged and emphasis will be placed on professional development for the sustainability professional. Students are not expected to have any previous experience with emissions markets, climate policy, economics or finance, however a basic understanding of fundamental economic principles will be useful.

### **Method of Evaluation**

Assessment of the course will be in four parts: classroom participation, in-class debate, case write-ups and a final group project.

- Classroom participation: 25%
- In-class debate and write up: 25%
- Case write ups: 25%
- Final project: 25%

Students are expected to be punctual, prepared to contribute to class discussion, and will be held to the highest standards of academic integrity. All written assignments are due at the beginning of class and any late submissions will be penalized by one-half letter grade per day.

### **Classroom participation**

Students are expected to attend class having completed the pre-class reading and are strongly encouraged to provide meaningful interventions and contribute to in-class discussion. Classroom participation will also include a short discussion of current events and several case discussions. Students should be prepared to offer positive contributions while staying on scope and without monopolizing class discussion.

### **In-class debate and write up**

Students will participate in a series of in class team debates. Debate topics and teams will be assigned in class. The format of the in-class debate will be as follows: team position statement (10 minutes / each team), rebuttal preparation (10 min), rebuttal (5 minutes/each team), discussion (10 minutes). Teamwork will be essential for the debate and teams are expected to assign 2-3 students to present the position statement, and an alternate 2-3 students to provide the rebuttal. All team members are expected to participate in the in-class discussion. In addition to the in class debate, students are expected to complete an individual write-up (1-3 pages) of the debate which is due during the class session following your team's in class debate. The write up should address the following questions:

What was your group's position in the debate? Did you agree with this position? Why? Did your position change during or after the debate? Why? What is your current opinion on the topic?

### **Case write-ups**

Case write-ups are expected to be between two to three pages and are due at the beginning of the class session in which the case will be discussed. Students must write up all cases presented in class. Students may choose (but are not required) to answer the questions posed in the case, but should offer an analytical response to one or more of the issues discussed in the case. One good approach is to prepare your write-up from the perspective of one of the participants in the case.

A good overview of the case method and how to prepare for a case is available for download from the Kennedy School: [http://www.ksgcase.harvard.edu/images/other/1136\\_0.pdf](http://www.ksgcase.harvard.edu/images/other/1136_0.pdf)

### **Final Group Project**

The final project entails a group presentation and a final report on a topic connected with the course. Work groups will be organized around three spheres based on student interest (i) public/multilateral, (ii) private sector, and (iii) non-profit/NGO. You and your team will be asked to play the role of a market participant and present to a defined constituency (i.e. board, client etc). The presentation should be approximately 20-25 minutes long (plus 5-10 minutes for Q & A). In addition to the presentation, the group should provide a written report which should not exceed 8-10 pages and is due at the final class session. The final project will account for 35% of the final grade and will be equally weighted between group and individual contributions. You are expected to submit three outputs in support of the final project (i) a PPT slide deck, (ii) a final written paper, and (iii) individual 360 degree peer reviews. The final assignment and peer review template will be distributed in class.

Teamwork and time management will be crucial during the final group project. Groups are encouraged to go beyond a simple briefing, and offer an analytical assessment of the issue or project being discussed. Several topics will be provided in class; however groups may also propose their own topic. If relevant to your topic, you should be prepared to present quantitative analytics to support your position.

Course Schedule:

#### **Session 1**

Class Plan

1. Introduction
2. Course overview and learning objectives
3. What are environmental markets?
4. Pricing carbon and other ecosystem services

Required Readings:

Labatt, (Forward)

(Skim) Millennium Ecosystem Assessment (summary statement)

(Optional) Levinson, ch. 1

#### **Session 2**

1. Climate change and its impacts
  - Introduction to the physical dimensions of climate change
  - Physical and economic impacts and the cost of inaction
  - Mitigation vs. adaptation
2. Emissions trading and pricing carbon
  - Economics of the global commons
  - Market failure and economic externalities
  - Trading vs. tax vs. command and control
  - Fundamentals of cap-and-trade
3. Introduction to the Kyoto Protocol and its flexible mechanisms
  - Financial tools to address climate change
  - Evolution of the international carbon market
4. Discuss current events assignment

Assignments Due

Course expectations and self assessment (< 1page)

Required Readings:

Labatt, ch. 1 & ch. 4 (skim)

Bayon, ch. 1

The Economics of Climate Change: A Primer. US Congressional Budget Office, 2003, pp 1-42

Recommended Readings:

(Skim) Intergovernmental Panel on Climate Change (IPCC), "Climate Change 2007: Synthesis Report", Summary for Policymakers

Stern Report, short summary

### **Session 3**

Impact Investing: Guest Lecturer

### **Session 4**

Class Plan

1. Case discussion: Costa Rica
2. CDM and carbon offset project development
  - Types of projects and the project lifecycle
  - Additionality and other eligibility criteria
  - Understanding risk and risk management
3. Fundamentals of pricing and trading carbon
  - Transferable permits and property rights
  - Emissions trading and the EU ETS
  - Introduction to MAC curves

Assignments Due

Due: Costa Rica case write-up (2-3 pages)

CASE: Costa Rica's Forests and the Market for Carbon Emissions Reduction Credits, JFK School Case Program, Case Reference #1560.0

<http://www.ksgcase.harvard.edu/casetitle.asp?caseNo=1560.0>

Required Readings:

Readings: -

Labatt Ch. 6

(Skim) "State and Trends of the Carbon Market Report", World Bank Carbon Finance Unit:

<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTCARBONFINANCE/0,,contentMDK:23206428~menuPK:5575595~pagePK:64168445~piPK:64168309~theSitePK:4125853~isCURL:Y,00.html>

(Optional) Levinson, ch. 8

McKinsey & Company. 2007. Executive summary. Reducing U.S. Greenhouse Gas Emissions: How Much and at What Cost?

[http://www.mckinsey.com/Client\\_Service/Sustainability/Latest\\_thinking/Reducing\\_US\\_greenhouse\\_gas\\_emissions](http://www.mckinsey.com/Client_Service/Sustainability/Latest_thinking/Reducing_US_greenhouse_gas_emissions)

## **Session 5**

Class Plan

1. International Carbon
2. Regional Carbon Markets

Required Readings:

- Wara, Michael, "Measuring the Clean Development Mechanism's Performance and Potential", 55 UCLA Law, Review (2008) pp. 1770--1803 -
- Gillenwater, Michael; GHG Management Institute; "What is Additionality?"

Recommended -

- (Skim) Pew Climate Center. 2009. American Clean Energy and Security Act of 2009 at a Glance at <http://www.pewclimate.org/docUploads/Waxman-Markey-short-summary-revised-June26.pdf>
- (Skim) Pew Climate Center. 2009. Eight Myths about the Waxman---Markey Clean Energy Bill. at <http://www.pewclimate.org/docUploads/Policy-Memo-2-8-Myths-July09.pdf>
- (Skim) Environmental Defense Fund. 2009. Key Features of the American Clean Energy and Security Act at <http://www.edf.org/article.cfm?contentID=9854>
- (Skim) U.S. EPA "Endangerment" and "Cause or Contribute" Findings, and Frequently Asked Questions: <http://www.epa.gov/climatechange/endangerment/> and [http://www.epa.gov/climatechange/Downloads/endangerment/EndangermentFinding\\_FAQs.pdf](http://www.epa.gov/climatechange/Downloads/endangerment/EndangermentFinding_FAQs.pdf)
- (skim) EMA's Best Practices for Market Based Systems - available at: <http://www.emahq.org/news-resources/principles>

## **Session 6**

1. Debate #1 - Tax vs. command & control vs. market mechanism.
1. Debate #2 - The Effectiveness of the CDM

## **Session 7**

1. Debate #3 - CDM

2. Prepare for trading simulation

### **Session 8**

Class Plan

Trading Simulation

Assignments Due

Due: Debate #2 & #3 write ups

Required Readings:

Markets for Cleaner Air: Cap & Trade Simulation: Participant Instructions (Courseworks) - ET Simulation Users Guide

### **Session 9**

Markets for renewable energy and energy efficiency

Required Readings:

Bayon, Chapter 3

Solar Renewable Energy Certificate (SREC) Markets: Status and Trend - Read up to page 19

Clean Energy Standards: State and Federal Policy Options and Implications (Pew)

United States Building Energy Efficiency Retrofits - Read Exec Summary

### **Session 10**

Class Plan

1. Case Discussion: The Southern Company

2. US Acid Rain Program

i. History of the US Acid Rain Program

ii. Trading in SO<sub>2</sub> and NO<sub>x</sub>

3. Mitigation banking in the US and abroad

4. International conservation and biobanking

Assignments Due

Due: Acid Rain case write---up

Required Readings:

• CASE: Acid Rain: The Southern Company (A & B), Harvard Business School Case Program, case #9-793--040

• (Review) EPA Cross State Rule website: <http://www.epa.gov/crossstaterule/>

### **Session 11**

Class Plan

Guest Lecturer- New Energy Finance

### **Session 12**

Group Presentations

### **Session 13**

Group Presentations

