

CARBON FINANCE (B8363)

August Block Week 2016

Professor Bruce Usher

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Office Hours: By appointment only

Class schedule

August 29th and 30th: 9:00 am – 6:00 pm with two 15-minute breaks and a one-hour lunch break.

August 31st: 9:00 am – 12:15 pm with one 15-minute break.

REQUIRED COURSE MATERIAL

The Carbon Finance course utilizes the following cases, articles and background notes:

Introduction to Carbon Finance

- Speeding Ahead to a Better Place (512-056)
- Tesla Motors (714-413)

Emissions Trading

- International Carbon Finance and EcoSecurities (HBS 208-15)
- American Electric Power: Investing in Forest Conservation (OIT-96)

Financing Renewable Energy Projects

- The Jersey-Atlantic Wind Farm (Columbia 120307)
- Keystone Solar (Columbia 130305)

Financing Clean Energy

- Khosla Ventures: Biofuels Strategy (HBS 809-004)
- First Solar, Inc in 2010 (SM-190)
- Pattern Energy (Columbia 160308)

Financing Energy Efficiency

- Edward Lundberg and the Rockville Building (HBS 212-067)

Carbon Capture and Store

- Adapting to Climate Change: The Case of Suncor Energy (Ivey 9B08M073)

Socially Responsible Investing

- Stanford Dumps Coal (Columbia 150307)

REQUIRED PREREQUISITES AND CONNECTION TO THE CORE

B8306 - Capital markets and investment is a prerequisite for this course.

The learning in this course will utilize, build on and extend concepts covered in the following core courses:

Core Course	Connection with Core
Corporate Finance	<ol style="list-style-type: none"> 1. Time value of money 2. Efficient markets 3. Risk 4. Capital Asset Pricing Model
Decision Models	<ol style="list-style-type: none"> 1. Use of analysis in decision making 2. Decision making under uncertainty and risk 3. Sensitivity analysis
Global Economic Environment I	<ol style="list-style-type: none"> 1. Role of financial markets in the economy
Managerial Economics	<ol style="list-style-type: none"> 1. Analyzing complex decision making under uncertainty

Students will be expected to have mastered these concepts and be able to apply them in the course.

Students who have previously taken Finance & Sustainability (B8349) will find significant overlap with this course; approximately 35% of the material is the same. Students who have completed Finance & Sustainability should only take Carbon Finance if they have a serious interest in financing solutions to climate change.

COURSE DESCRIPTION

Climate change may be today's most serious challenge to the future well being of our planet. The extent of the environmental and economic impact from climate change is uncertain; however, the recent scientific evidence is increasingly worrisome, suggesting that the world's businesses and governments may have to take aggressive and coordinated steps in order to avert a catastrophe. Carbon finance - which refers to investments in greenhouse gas emission reduction companies and projects, and the creation of financial instruments that effectively put a price on carbon emissions – is required to transform our global economy.

This block week course will explore the science of climate change and its related economic and environmental impacts, and carefully examine the financial tools and techniques that can be applied to combat climate change in the context of evolving global policy. Specific areas to be covered include the use of capital markets to create market-based emissions trading systems, venture capital to develop low emissions technologies, project finance to build renewable energy projects, real estate finance to implement energy efficiency, and corporate finance to manage businesses impacted by climate change and ultimately, related regulatory changes.

This is a finance course, designed around a combination of cases and financial tools to reach our course objectives. The course is composed of 6 modules:

I. Background. Understanding the science of climate change and related impact on the environment, and introducing the application of financial tools to this problem. The electric car industry will be examined to understand the potential to reduce greenhouse gas emissions and the challenges associated with innovating an entire sector of the economy.

Climate Change Science and Introduction to Carbon Finance: What is the problem, and how can carbon finance address it?

II. Capital Markets Tools. Critical analysis of carbon markets, including allowance markets and carbon credit offset programs.

The EU Emissions Trading System, the Kyoto Protocol and the Clean Development Mechanism: International treaties and market based mechanisms, credit trading systems, and forestry offsets.

III: Investment Tools. Investing in companies and projects that have the potential to reduce emissions of greenhouse gases, including renewable energy sectors such as biofuels, wind and solar.

Part 1: Financing Renewable Energy Projects: How can we increase the availability of renewable energy through project finance?

Part 2: Financing Renewable Energy Companies: What are key considerations when investing in companies developing innovative renewable energy technologies?

IV: Financing Energy Efficiency. Evaluating the challenges and opportunities of investing in energy efficiency in the real estate sector.

V: Carbon Capture and Sequestration. Evaluating the challenges and opportunities of investing in the capture and sequestration of greenhouse gases from fossil fuel production.

V: Socially Responsible Investing. Analysis of the most recent and innovative investment tools and products for tackling climate change, including the movement to divest portfolios of fossil fuel investments, and the growth of the green bond sector.

COURSE OBJECTIVES

This course is designed for both MBA students planning a career in financial services who want to understand the financial implications of climate change, and for students planning a career in a climate change-related field (such as renewable energy companies, non-profit or government organizations) who want to understand the application of the relevant financial tools. The course will also be useful for future consultants or general managers who may help their clients or employer develop and implement “green business” strategies.

Specifically, the course objectives are to:

1. Understand the scientific issues underlying climate change.
2. Analyze which financial tools have been used to date, and their relative effectiveness in combating climate change.
3. Evaluate financial tools and strategies that might be used in the future, in the context of a carbon-constrained global economy and national and international policy developments.

ASSIGNMENTS

This course requires substantial preparation. As this is predominantly a case based course, it is essential that every student carefully reads the assigned cases and comes to class prepared to actively participate and contribute to the class discussion. To make the most effective use of your time, the assigned readings will inform you of what cases and sections to focus on and study questions will be provided as guidance. Students will be required to complete short poll questions on the case readings, due online in Canvas, the evening prior to the start of each class. Completion of the poll questions will contribute towards your class participation grade.

The final exam is a take-home case analysis. It will be available at the end of the last class and due one week later.

METHOD OF EVALUATION

This course relies predominately on the case method. The focus of most of the classes is on understanding concepts, and the challenges and opportunities of applying those concepts in real-world settings. The chosen cases analyze companies that invest in projects and businesses that reduce emissions of greenhouse gases, in order to understand why certain business decisions and models have succeeded while others have failed. This course requires active class participation, and students' grades will be heavily dependent on the quality of class discussion. Students are expected to challenge each other and to challenge the professor and our guests.

Class participation	50%
Final take-home exam (Type C - individual)	50%

CLASSROOM NORMS AND EXPECTATIONS

Students are required to prepare for each class by reading and analyzing the assigned cases, utilizing the study guidance questions which are provided in the Canvas system. Students are expected to add thoughtful analysis to each class discussion.