**CLIMATE FINANCE (B8363)**

**January Block Week 2019**

Professor Bruce Usher

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Office Hours: By appointment only

**Class schedule**

January 14th and 15th: 9:00 am – 6:00 pm with two 15-minute breaks and a one-hour lunch break.

January 16th: 9:00 am – 12:00 pm with one 15-minute break.

**COURSE DESCRIPTION**

Climate change may be today’s most serious challenge to the future of humanity. 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 steps to avert a catastrophe. Climate finance - which refers to investments in companies and projects that reduce greenhouse gas emissions, and the creation of financial instruments designed to reduce 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, project finance to build renewable energy projects, venture and growth capital to fund innovative low emissions technologies, and investment management to direct capital towards public companies engaged in climate change solutions and away from companies emitting significant greenhouse gas emissions.

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 investment to this problem. The electric vehicle 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 Climate Finance: What is the problem, and how can climate finance address it?
* Electric Vehicles: What is the opportunity, what are the challenges, and how to create a new product in a traditional industry?

*II. Capital Markets Tools*. Critical analysis of carbon markets, with a focus on carbon credit offset programs.

* International treaties and the theory of market-based mechanisms and credit trading systems.
* Carbon credit markets as a financial tool to reduce industrial greenhouse gas emissions and to protect forests and reduce deforestation.

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

* Financing Renewable Energy Projects: What are the economics of wind and solar projects? How can we increase the availability of renewable energy through project finance for wind and solar projects?
* Financing Renewable Energy Companies: Which financial instruments are best suited to providing capital at scale to well established renewable energy companies?
* Energy Storage: Understanding the need for storing energy, and the economics of incorporating energy storage into the modern electrical grid.
* Financing Innovation: What are the challenges for venture capital funding of innovative low-emission products and technologies?

*IV: Carbon Capture and Storage*. Evaluating the challenges and opportunities of funding the capture and sequestration of greenhouse gases from fossil fuel production, followed by a brief discussion on geoengineering.

*V: Socially Responsible Investing*. Analysis of the movement to divest investment portfolios of shares in fossil fuel companies, and the growth of the green bond sector.

*VI: Wrap-Up.* Understanding the future trajectory of greenhouse gas emissions in the context of the mitigation opportunities discussed in the course, and the implications for climate change.

***Students who have previously taken Finance & Sustainability (B8349) will find significant overlap with this course; approximately 30% of the material is the same. Students who have completed Finance & Sustainability should only take Climate Finance if they have a serious interest in financing solutions to climate change.***

**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.

**REQUIRED COURSE MATERIAL**

Students prepare for the course by reading the book *Renewable Energy, A Primer for the Twenty-First Century*, providing background on the topic. To prepare for each class, students will be required to read the following cases, articles and background notes:

Electric Vehicles

* + Speeding Ahead to a Better Place
  + Tesla Motors

Emissions Trading

* International Carbon Finance and EcoSecurities
* American Electric Power: Investing in Forest Conservation

Financing Renewable Energy Projects - Wind

* + The Jersey-Atlantic Wind Farm

Financing Renewable Energy Projects - Solar

* SunEdison

Financing Renewable Energy Companies

* Pattern Energy

Financing Innovation

* Khosla Ventures: Biofuels Gain Liquidity

Carbon Capture and Store

* AEP: Carbon Capture and Storage

Socially Responsible Investing

* Stanford Dumps Coal

**REQUIRED PREREQUISITES AND CONNECTION TO THE CORE**

Students must have completed or be concurrently enrolled in B8306 - Capital markets and investments. The learning in this course will utilize, build on and extend concepts covered in the following core courses:

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| **Core Course** | **Connection with Core** |
| Corporate Finance | * Discounted cash flow models * Capital structure and cost of capital * Risk and return * WACC and leverage |
| Strategy Formulation | * Cost leadership * Implementation |
| Marketing | * Segmentation and targeting * Influencing customer behavior |
| Managerial Economics | * The limits of markets * Agency and incentives |

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

**ASSIGNMENTS**

This course requires substantial preparation, including reading a short book prior to the start of the course. 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. 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 is 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 companies that reduce emissions of greenhouse gases, 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.

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

**CLASSROOM NORMS AND EXPECTATIONS**

Students are expected to adhere to CBS Core Culture in this course by being Present, Prepared, and Participating.

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

There is a “no devices” policy in this course. Please leave your phones and computers off. Violations of this policy will lead to deductions from a student’s class participation grade.

Students are requested to sit in the same seat for the duration of the course to enhance class discussion and facilitate grading of class participation. Please choose your seat in the first class.