

SYLLABUS

Duke University
ENERGY 620: Energy Finance
Professors Scott Rockart and Chris Wedding

Instructor Contact Information

Professor Scott Rockart

- Email: srockart@duke.edu
- Office Hours: By appointment, email to schedule.

Professor Chris Wedding

- Email: chris.wedding@duke.edu
- Office hours: By appointment. Email me with the topics you'd like to discuss.

TA: Yiheng Hao

- Email: yiheng.hao@duke.edu
- Office hours: By appointment. Email to schedule 10-15 minute slots.

Time and Location

- Wednesdays 3:05pm - 5:35pm
- French Science 4233

Course Objectives

This course exposes students to key topics in energy finance including: discount rates and discounted cash flows, valuation approaches, project finance, option pricing, real options, ratios analysis, energy derivatives, venture capital, corporate acquisitions, energy access, carbon capture, renewable energy, energy storage, and green real estate finance. The goal of the course is to increase your understanding of financing, investment, and hedging decisions as they relate to energy companies and energy-related projects.

Organizational Matters

The Sakai site contains links to all course materials that are not linked in this document.

Class Meetings and Attendance:

We expect you to attend all classes regularly and on time, having prepared beforehand all assignments and readings. We will track attendance. If you arrive late or leave early, you may not get credit for attending that day. If you have to miss class for a conference or other academic reason, you can be excused if you submit to the TA a list of 10-15 things you learned at the event you attended.

Assignments and grading:

Your course grade will be based on a final exam, individual and team assignments, and class participation. The following weights will be used in calculating your final grade:

Final Exam	25%
Individual Assignments	25%
Team Assignments	25%
Class Participation	25%

The final exam reflects your individual effort, is cumulative, and is *open-book, open-notes*.

Class participation is an individual effort. It is mandatory that you attend class and come prepared to participate actively in the discussion. The questions provided for cases and readings will help you prepare for class. Learning for everyone in this class is enhanced through debate, different perspectives, and new insights. Keep in mind that your goal should be to contribute high-quality comments, *not* just high-quantity.

There will be a number of individual and team assignments over the course of the semester.

Grading is based on the following:

- Accuracy - e.g., the correct answer
- Insight - e.g., original commentary, breadth of perspectives, correct logic (where applicable)
- Rigor - e.g., depth of arguments, awareness of pros / cons, excellence compared to peers
- Polish - e.g., formatting, typos, writing quality
- Structure - e.g., followed directions

After each team assignment, you will grade your fellow group members as follows, and take into consideration the timeliness, quantity, and quality of work. See separate Sakai assignments for each team project.

Students may submit at most *one* late assignment during the semester, and must notify the professor before the assignment's due date with a reasonable explanation for why the assignment is late, and when it will be delivered (certainly no more than a very few days after the official due date). Other late assignments will not be graded.

Other climate finance resources:

Students are also encouraged to subscribe and listen to these podcasts, which frequently cover energy finance trends:

- [My Climate Journey](#)
- [Currents](#)
- [Redefining Energy](#)
- [Catalyst](#)
- [Entrepreneurs for Impact](#) (with Chris Wedding)

Disclaimer:

Content, schedules, and assignments in the syllabus may change during the semester. If changes occur, students will be notified.

Duke University Honor Code:

The Duke University Honor Code applies to all aspects of this course. We will not tolerate any infraction of the Honor Code. The nature of each assignment indicates the type of communication and consultation that is permitted. Work that is described as an individual effort is to be your work alone, without consultation or assistance from any other person. Work that is described as a team effort is to be your team's effort alone, again without consultation or assistance from anyone else. If you are uncertain about the nature of collaboration for any assignment, please ask us.

AI Policy:

Learning to engage productively with AI is an emerging and powerful skill. We recognize that some of you may want to use AI on your assignments for this and other reasons.

We strongly encourage you to do the assignments on your own without using AI. The assignments are designed to develop your ability to think about these issues. Using AI for the assignments can undermine this important objective.

If you choose to use AI, only use it after you've done the original work (e.g., to check your answers). Using AI tools to produce complete responses to any assignments is prohibited.

Don't trust what generative AI says. If it gives you a number or a fact, assume it is wrong unless you either know otherwise or have verified against another source. Given this, it works best for

topics you already understand. If it provides an opinion, question that opinion. An answer clearly is not the same as a strong answer. You will be responsible for any errors of fact and the quality of thought in your work.

If you use AI tools in your work, you must acknowledge it as a source. Please include a paragraph at the end of any assignment where you use AI explaining what you used it for, and what prompts you used to get your results. Please also include the complete original output from the AI tool. Failure to do so is in violation of academic honesty policies.

Bloomberg Market Concepts (BMC) Certification:

In addition to the assignments listed below, students will earn a certificate for completing the Bloomberg Market Concepts course, which they can list on their resumes. For full details of this requirement, including the completion deadline, please see the Bloomberg Market Concepts course in the Assignments tab on Sakai. This assignment is not graded, but failure to complete it by the listed deadline will have a detrimental impact on your grade.

Course Schedule

Week 1

Dr. Chris Wedding

(1/11)

Topics: Overview of global investment in clean energy (financial and non-financial drivers). How do you get to “yes” re: a clean energy investment decision.

Readings for class:

- [The Climate Capital Stack – A Buyer’s Guide to Financing Your Climate Venture](#) - CTVC
- [The Sophisticating Climate Capital Stack](#) - CTVC
- [The real reasons why a VC passed on your startup](#) - Entrepreneur's Handbook

Optional assignment due today: For extra credit, Q&A #1

Week 2 (1/18) Fundamentals of Investment Decisions

Dr. Scott Rockart

Topics: We will cover the basic concepts around evaluating investments, with a focus on determining and valuing expected cash flows.

Readings: Since this is expected to be a refresher for most of us, there are **no required readings**. For those who have had less background in this material (or studied it long ago) the first few chapters of any Corporate Finance textbook (and really any edition, thus easy to find in Duke libraries) can provide a useful reference (e.g., chapters 2, 5, and 6 in the Fourteenth Edition of “Principles of Corporate Finance” by Bealey, Myers, Allen, and Edmonds - hereafter referred to as “Principles of Corporate Finance”). That said, everything you need to know on this topic for this course will be covered in class.

Case: [Project Helios: Harvesting the Sun](#) (HBS coursepack), prep questions will be posted on Sakai)

Assignment: None, but be prepared to discuss the Project Helios case prep questions posted on Sakai (this is also a good chance to work on the Bloomberg Market Concepts certification)

Week 3 (1/25) Fundamentals of Financing Investments: Risk and Expected Returns

Dr. Scott Rockart

Topics: We will cover the basic concepts around capital structure, risk, and expected returns with a focus on understanding the appropriate discount rates for investments.

Readings: Since this is also expected to be a refresher for most of us, there are **no required readings**. For those who have had less background in this material (or studied it long ago) the chapters around 'risk' and 'financing decisions' of any Corporate Finance textbook (and really any edition, thus easy to find in Duke libraries) can provide a useful reference (e.g., chapters 7-9 and 12-14 in "Principles of Corporate Finance"). That said, everything you need to know on this topic for this course will be covered in class.

Case: [Midland Energy Resources, Inc.](#): Cost of Capital (HBS coursepack), prep questions will be posted on Sakai)

Assignment: None, but be prepared to discuss the Midland Energy Resources case prep questions posted on Sakai (this is also a good chance to work on the Bloomberg Market Concepts certification)

Week 4 (2/1) Energy Investment Decisions: Applied Session

Dr. Scott Rockart

Topics: We will look at an energy investment and analyze it in depth.

Case: [AES Tiete](#) (HBS coursepack), prep questions will be posted on Sakai)

Readings: Background on [Green PPAs by the Environmental Protection Agency](#) and [PPAs by Eurelectric](#) (the federation of the European electricity industry)

Assignment Due Before Class: NPV Assignment and be prepared to discuss the AES Tiente case prep questions posted on Sakai

Week 5 (2/8) Uncertainty and Financial Options

Dr. Scott Rockart

Topics: We will discuss financial options, their use in managing risk, and methods of valuing options.

Readings: Since this is also expected to be a refresher for most of us, there are **no required readings**. For those who have had less background in this material (or studied it long ago) the chapters around 'options' and 'valuing options' of any Corporate Finance textbook (and really any edition, thus easy to find in Duke libraries) can provide a useful reference (e.g., chapters 21 & 22 in "Principles of Corporate Finance"). That said, everything you need to know on this topic for this course will be covered in class.

Week 6 (2/15) Uncertainty and Real Options

Dr. Scott Rockart

Topics: We will look at how uncertainty can affect when, how, and whether we make investments.

Readings: [Real-World Way to Manage Real Options](#) (HBS coursepack), prep questions for this reading will be posted on Sakai). As usual, those looking for additional (not required) readings will find the chapter on 'real options' of any Corporate Finance textbook (and really any edition, thus easy to find in Duke libraries) can provide a useful reference (e.g., chapter 23 in "Principles of Corporate Finance"). That said, everything you need to know on this topic for this course will be covered in class or in the required reading listed above.

Assignment Due Before Class: Financial Options Assignment

Week 7 (2/22) Uncertainty and Managing Risk

Dr. Scott Rockart

Topics: We will look at how uncertainty faced by investments create risks, and how firms use financial instruments to manage those risks.

Case: [Fuel Hedging at JetBlue Airways](#) (HBS coursepack), prep questions will be posted on Sakai)

Readings: [Forwards and Futures](#) (HBS coursepack)) As usual, those looking for additional (not required) readings will find the chapter on "risk management" of any Corporate Finance textbook (and really any edition, thus easy to find in Duke libraries) can provide a useful reference (e.g., chapter 27 in "Principles of Corporate Finance"). That said, everything you need to know on this topic for this course will be covered in class.

Assignment Due Before Class: Real Options Assignment and be prepared to discuss the JetBlue case prep questions posted on Sakai

Week 8 (2/29)

Dr. Chris Wedding

Topics: Cleantech and climate tech venture capital. Investor mentality. Founder perspectives. The process of raising and deploying capital.

Readings for class:

- [Climate Tech VC Newsletter](#) or [Entrepreneurs for Impact Newsletter](#) - read 6 issues of your choice
- [Five frontier challenges to deep decarbonization](#) - Climate Tech VC
- [What is a Venture Capital Fund?](#) - Angellist

Guest lecture:

- [Laura Dyer](#) - Investor at Buoyant Ventures

Assignment due today: Q&A #2

Week 9 (3/7)

Dr. Chris Wedding

Topics: Project finance for renewable energy and energy storage

Readings for class:

- [The Unglamorous Approach to Impact Investing In Energy](#) - Lacuna Sustainable Investments / PV Magazine
- [Levelized Cost of Energy+](#) - Lazard (skim, focus on graphs/charts)

Guest lecture:

- None

Assignment due today: Q&A #3

Assignment due next class (3/21): Wind project financial modeling. Energy storage project financial modeling.

SPRING BREAK (3/10 to 3/17) Hooray!

Week 10 (3/21)

Dr. Chris Wedding

Topics: Energy access (i.e., addressing energy poverty in developing countries).

Readings for class:

- [Blue Haven Initiative: The PEGAfrica Investment](#) - (HBS coursepack)

Guest lecture:

- [Jonathan Phillips](#) - Director, [Energy Access Project](#), Duke University

Assignment due today: Wind project financial modeling. Energy storage project financial modeling.

Week 11

Dr. Chris Wedding

(3/28)

Topics: Green real estate finance

Readings for class:

- [Edward Lundberg and the Rockville Building: Energy Efficiency Finance in Commercial Real Estate](#) - (HBS coursepack)
- [Bricks, Mortar and CarbonHow Sustainable Buildings Drive Real Estate Value](#) - Morgan Stanley

Guest lecture:

- None

Assignment due today: Q&A #4

Assignment due next week (4/4): Green building pro forma: Base case vs. LEED building.

Week 12

Dr. Chris Wedding

(4/4)

Topics: Corporate acquisitions; Fundamental (ratios) analysis; Corporate reporting (10-K); SPACs

Readings for class:

- [Corporate Finance Ratios](#) - CFI
- [How to Calculate the Debt Service Coverage Ratio?](#) - CFI
- [ENGIE: Strategic Transformation of an Energy Conglomerate - Harvard Business Publishing](#) (HBS coursepack)

Assignment due today: Green building pro forma: Base case vs. LEED building.

Assignment due next week (4/11): Quantitative analysis to decide whether to invest in Tesla or First Solar.

Week 13

Dr. Chris Wedding

(4/11)

Topics: Green hydrogen and carbon capture. Costs and value drivers.

Readings for class:

- [Levelized Cost of Energy+](#) - Lazard (skim, but read pages 24-32)
- [Circular Carbon Market Report 2022](#) - Look for implications of this research for how carbon tech companies are being funded (or not)

Guest lecture:

- [Mike Adams](#) - VP, Capital Management, [8 Rivers](#)

Assignment due today: Quantitative analysis to decide whether to invest in Tesla or First Solar.

Background on your two professors:

Dr. Scott Rockart

Eads Associate Professor of the Practice in Energy Finance and Faculty Fellow in the Energy Initiative

After completing an undergraduate degree with honors in Economics at Princeton University, Scott spent two years in consulting with McKinsey and Company and a year teaching finance and accounting in Czechoslovakia. Afterward, he earned an MBA and PhD from MIT in behavioral and policy sciences and management science. He has been a faculty member at London Business School (2000-2002), the University of North Carolina at Chapel Hill (2010 – 2016) and Duke's Fuqua School of Business (2002-2010, and 2017 to the present).

Scott's research has appeared in Management Science, Organization Science, the System Dynamics Review, and the Strategic Management Journal. He is an associate editor at the System Dynamics Review and serves on the editorial review boards of the Strategic Management Journal and Strategy Science.

Dr. Chris Wedding

Executive in Residence - Fuqua School of Business

Gosnell Visiting Professor - Department of Economics

Adjunct Associate Professor - Nicholas School of the Environment

Dr. Chris Wedding's professional focus is private equity, venture capital, impact investing, corporate sustainability, renewable energy project finance, green building strategy, climate tech innovation, entrepreneurship, and teaching, with 20 years of experience, 80,000 students taught, and \$1B+ in investment experience.

In addition to his work at Duke, Dr. Wedding is also a Professor of the Practice with the University of North Carolina at Chapel Hill (UNC) Kenan-Flagler Business School; the Managing Director of IronOak Energy Capital, a strategy consulting firm focused on renewable energy finance; the Founder of [Entrepreneurs for Impact](#), which provides executive coaching for dozens of climate CEOs and investors; and one of the earliest LEED Accredited Professionals with the US Green Building Council. He was also a Director and Senior Advisor at Cherokee Investment Partners, a private equity firm that raised over \$2 billion in private equity funds and, separately, founded or invested in 150 startups and venture funds.

He brings a global perspective, with experience in 23 countries and language abilities in Spanish, Japanese, and Creole. He is a connector, catalyst, and frequent speaker at national and global energy and finance conferences.

Dr. Wedding received a BS summa cum laude in Environmental Science from Western Kentucky University, where he was a national Goldwater Scholar in Math and Science. At UNC, he earned an MS and PhD focused on business and strategy in real estate and energy. You can learn more about climate finance and startups via [his newsletter](#) and [his podcast](#).

Final note:

If you're seeing this, it means that you read the full syllabus. Congratulations. You passed the first test. Please email yiheng.hao@duke.edu with only the subject line: "I SAW THE FINE PRINT." :) This counts towards your Participation grade.