

Risk Analysis & Environmental Management

OIDD-2610/ 7610-401

Professor Michael Panfil

Spring 2024

Thursday, 3:30-6:30PM EST

Huntsman Hall, TBD

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COURSE DESCRIPTION

This course will introduce students to core concepts, learnings, and frameworks in risk and environmental management, with a focus on climate change-related risks. The class will explore a variety of approaches to risk analysis, drawing from practices across financial actors and economics sectors.

The course is broadly broken into three parts, organized into: (1) risk identification; (2) risk communication and framing; (3) risk management; and (4) risk allocation. Classes involve a combination of lecture, student participation, guest lecture, and simulation.

CLASS LOGISTICS

Lectures and virtual learning

The class is held in-person. Absences are excused consistent with school policy. Please do **not** attend if you are ill; your health and the safety of all students is our priority.

Where videos are used, students are not allowed to download and repost or share course videos anywhere. Doing so is a violation of the Code of Academic Integrity.

Reading

This class does not use an assigned textbook; readings are free and available online, noted and linked with each class below. All readings are required unless designated as “skim/optional,” which may be discussed briefly in class but are intended primarily to provide additional reading for students interested in a particular topic.

Students are expected to read each required assignment before that day’s class and to be prepared to critically analyze the topics found therein during class discussions. Additional, adjusted, and/or

substitute readings will be assigned during the course of the semester in order to reflect current events or for other reasons.

Class Participation

Class will use a rotating 'on-call' system. Students are expected to engage in discussion during days when they are on call, however any student is welcome to participate in discussion on days when not on call.

Class will often also involve simulations and group exercises. All students are expected to participate, regardless of whether the student is on-call.

Midterm

Midterm exam will be 90-minute, closed book. Students can prepare and bring a single 3x5 notecard (front and back). The exam may cover any material discussed in the course to date but will **not** include information solely provided via guest lectures or reading only.

Presentation

Presentations will take place in the final two weeks of the semester. Presentations will apply material covered in class to a current event, topic, or activity. Students have 8-10 minutes to present, should prepare PowerPoint slides, and plan to address any questions asked.

Presentations will be done in groups of four.

Course Grading

Class participation	30%
Midterm	30%
Presentation	40%

SCHOOL POLICIES

Students are to work individually on all assignments unless otherwise indicated. Students are encouraged to discuss course themes and topics with each other, but the final exam and quizzes must be done individually. Plagiarism is taken seriously and will be dealt with according to university policy. Students must adhere at all times to the University of Pennsylvania's Code of Academic Integrity.

(Syllabus on following pages)

SYLLABUS

PART 1: RISK IDENTIFICATION

January 18 (Class 1): What is risk analysis and environmental management?

The first class will introduce the concept of risk analysis and environmental management, with a focus on risks associated with climate change.

- **Read:**
 - Chatham House (2021). Climate change risk assessment 2021: <https://www.chathamhouse.org/2021/09/climate-change-risk-assessment-2021/summary> (1 page summary only).
 - Risk Management Strategies in an Uncertain World (2002): https://www.ldeo.columbia.edu/chrr/documents/meetings/roundtable/pdf/roundtable_exec_final.pdf (pg. 3-8)
 - Vicki Bier and Rae Zimmerman. *Risk Assessment of Extreme Events*: https://www.ldeo.columbia.edu/chrr/documents/meetings/roundtable/white_papers/bierzimm.pdf (1-13, 30-31, 37)
 - Roger Pielke and Dan Sarewitz. *Vulnerability and Risk: Some Thoughts From A Political and Policy Perspective*: http://sciencepolicy.colorado.edu/admin/publication_files/2003.23.pdf
- **Skim/Optional:**
 - CMRA. *Climate Mapping for Resilience and Adaptation*: <https://resilience.climate.gov/> (explore website and tools available)
 - World Economic Forum. *The Global Risks Report 2021*: <https://www.weforum.org/reports/the-global-risks-report-2021>
- **Exercise:**
 - Risk assessment and wildfire

January 25 (Class 2): Assessing and measuring risk

Class two will focus on the risk assessment, and how a climate risk assessment is conducted.

- **Read:**
 - EPA. *About Risk Assessment*: <https://www.epa.gov/risk/about-risk-assessment>
 - Consolidated Edison. *Climate Change Vulnerability Study* (2019): <https://www.coned.com/-/media/files/coned/documents/our-energy-future/our-energy-projects/climate-change-resiliency-plan/climate-change-vulnerability-study.pdf> (executive summary only, pg. 1-9)
- **Skim/Optional:**
 - RMS. *Measuring Disaster Risk* (2015): https://forms2.rms.com/rs/729-DJX-565/images/UNISDR_Sendai.pdf

- National Research Council. Science and Decisions: Advancing Risk Assessments (2009): <https://nap.nationalacademies.org/catalog/12209/science-and-decisions-advancing-risk-assessment> (ch. 3)
- **Exercise:**
 - Conducting a risk assessment - chemical spill

February 1 (Class 3): Risk disclosure

Class three focuses on the disclosure of risk, centering on the Securities and Exchange Commission's proposed standard that would mandate the disclosure of climate-related financial risk by publicly traded companies.

- **Read:**
 - Securities and Exchange Commission. *Fact Sheet: Enhancement and Standardization of Climate-Related Disclosures* (2022): <https://www.sec.gov/files/33-11042-fact-sheet.pdf>
 - Romany Webb (2022). *Key elements of the SEC's proposed climate-related disclosure rule*: <https://blogs.law.columbia.edu/climatechange/2022/03/23/key-elements-of-the-secs-proposed-climate-related-disclosure-rule/comment-page-1/>
- **Skim/Optional:**
 - Securities and Exchange Commission. *Proposed Rule: The Enhancement and Standardization of Climate-Related Disclosures for Investors* (2022): <https://www.sec.gov/rules/proposed/2022/33-11042.pdf> (emphasis on skim!)
 - Subodh Mishra, *SEC Climate Disclosure Comments Reveal Diversity of Views* (2022): <https://corpgov.law.harvard.edu/2022/08/31/sec-climate-disclosure-comments-reveal-diversity-of-views/>
 - Jacob Hupart, et al. *What Public Comments on the SEC's Proposed Climate-Related Rules Reveal—and the Impact They May Have on the Proposed Rules* (2022): <https://www.mintz.com/insights-center/viewpoints/2022-07-20-what-public-comments-secs-proposed-climate-related-rules>
- **Exercise:**
 - None

February 8 (Class 4): Uncertainty and risk

Class four grapples with questions of uncertainty and risk – with a focus on departures from historical precedent, correlated risks, and tail risks. Scenario analysis is introduced.

- **Read:**
 - Milley, P. C. D. et al. (2008). *Stationarity is Dead: Whither Water Management?*: https://www.law.berkeley.edu/files/CLEE/Milly_2008_Science_StationarityIsDead.pdf
 - GARP Podcast (2021). *Adapting to tail risks: surviving the cascading risks from climate change*. <https://www.garp.org/podcast/climate-surviving-risks-cr-211216> (listen)

- **Skim/Optional:**
 - James Rising, et al. (2022) *The missing risks of climate change*:
<https://www.nature.com/articles/s41586-022-05243-6>
 - Amy Myers Jaffe et al. (2019). *Impact of Climate Risk on the Energy System*:
https://cdn.cfr.org/sites/default/files/report_pdf/Impact%20of%20Climate%20Risk%20on%20the%20Energy%20System_0.pdf (22-31)
- **Exercise:**
 - Managing uncertainty and scenario analysis

PART 2: COMMUNICATING AND FRAMING RISK

February 15 (Class 5): Decision Problems, valuing risk and cost benefit analysis

Class Five introduces a variety of approaches to framing risk, with particular focus on cost benefit analysis.

- **Read:**
 - National Research Council (2001). *Basic Tools for Applied Decision Theory*:
<https://nap.nationalacademies.org/read/10566/chapter/5>
 - HBS Online (2019). *How to do a Cost-Benefit Analysis & Why it's Important*:
<https://online.hbs.edu/blog/post/cost-benefit-analysis>
 - Congressional Research Service (2021). *Social Cost of Greenhouse Gases*:
<https://sgp.fas.org/crs/misc/IF11844.pdf>
- **Skim/Optional:**
 - Steven Kelman (1981). *Cost-Benefit Analysis: An Ethical Critique (with replies)*:
<https://www.colby.edu/economics/faculty/thtieten/ec476/kelmanbca.pdf>
 - EPA. Chapter 5: Baseline: <https://www.epa.gov/sites/default/files/2017-09/documents/ee-0568-05.pdf>
 - Viscusi, K. and Aldy, J. (2003). *The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World*:
https://www.nber.org/system/files/working_papers/w9487/w9487.pdf
 - Lecture Highlights Video (2021) *Cost Benefit Analysis Economics*:
<https://www.youtube.com/watch?v=MQQSyX2HRgs>
- **Exercise:**
 - Conducting a cost-benefit analysis and the social cost of greenhouse gases

February 22 (Class 6): “ESG”

Class Six centers on the relationship between Environmental, Social, and Governance (ESG) investing and risk.

- **Read:**
 - S&P (2019). *ESG: Going beyond the balance sheet*:
<https://www.spglobal.com/en/research-insights/featured/special-editorial/esg-going-beyond-the-balance-sheet>

- NYU Stern (2021). ESG and Financial Performance:
<https://www.stern.nyu.edu/sites/default/files/assets/documents/ESG%20Paper%20Aug%202021.pdf>
- **Skim/Optional:**
 - None
- **Exercise:**
 - None

February 29 (Class 7): System collapse and climate risk

Class Seven focuses on climate-related risks posed to entire economies, societies, and systems.

- **Read:**
 - Financial Stability Oversight Council (2021). *Report on Climate-Related Financial Risk*:
<https://home.treasury.gov/system/files/261/FSOC-Climate-Report.pdf> (1-36; 123-125)
- **Skim/Optional:**
 - Madison Condon (2021). *Market Myopia's Climate Bubble*:
https://scholarship.law.bu.edu/faculty_scholarship/1087
 - Blackrock (2020). *A fundamental reshaping of finance*:
<https://www.blackrock.com/americas-offshore/en/larry-fink-ceo-letter>
- **Exercise:**
 - Risk to the system

March 7 – NO CLASS SPRING BREAK

March 14 (Class 8): Hidden risks and communication challenges

Class Eight considers instances where environmental risks are difficult to communicate or otherwise hidden. Unbundled renewable energy credits and methane leakage are used as case studies.

- **Read:**
 - Gautam Naik, S&P (2021). *Problematic Corporate Purchases of Clean Energy Credits Threaten Net Zero Goals*: <https://www.spglobal.com/esg/insights/problematic-corporate-purchases-of-clean-energy-credits-threaten-net-zero-goals>
 - Jeff St. John, Canary Media (2022). *A deeper dive into 24/7 carbon-free energy*:
<https://www.canarymedia.com/articles/energy-markets/a-deeper-dive-into-24-7-carbon-free-energy>
 - Benjamin Storrow, E&E (2020). *Methane Leaks Erase Some of the Climate Benefits of Natural Gas*: <https://www.scientificamerican.com/article/methane-leaks-erase-some-of-the-climate-benefits-of-natural-gas/>
- **Skim/Optional:**

- Zhiyuan Fan, et al. (2022). *Hydrogen Leakage: A Potential Risk for the Hydrogen Economy*: https://www.energypolicy.columbia.edu/sites/default/files/file-uploads/HydrogenLeakageRegulations_CGEP_Commentary_070722_0.pdf
- **Exercise:**
 - Class-led discussion, examples of hidden risk

March 21 (Class 9): Midterm

PART 3: MANAGING RISK

March 28 (Class 10): Managing risk

Class Ten revisits the climate vulnerability study, a focus of Class Two, and considers the second step in climate risk management: the implementation of resilience and adaptation.

- **Read:**
 - Consolidated Edison (2020). *Climate Change Resilience and Adaptation*: <https://cdne-dcxprod-sitecore.azureedge.net/-/media/files/coned/documents/our-energy-future/our-energy-projects/climate-change-resiliency-plan/climate-change-resilience-adaptation-2020.pdf?rev=f4447976161a4ce2ad5f4f7788a31628> (pg. 1-8)
 - Romany Webb et al. (2020). *Climate Risks in the Electricity Sector: Legal Obligations to Advance Climate Resilience Planning by Electric Utilities*: <https://law.lclark.edu/live/files/32603-51-3-webbpdf> (pg. 582-604).
- **Skim/Optional:**
 - Consolidated Edison. *Climate Change Vulnerability Study* (2019): <https://www.coned.com/-/media/files/coned/documents/our-energy-future/our-energy-projects/climate-change-resiliency-plan/climate-change-vulnerability-study.pdf> (refresh, following original read in Class 2).
- **Exercise:**
 - Implementing a resilience and adaptation plan

April 4 (Class 11): Precautionary principle, moral hazards, and political risk

Class Eleven covers a variety of approaches, frameworks, and tools relevant to the management of risk.

- **Read:**
 - IISD (2020). *The Precautionary Principle*: <https://www.iisd.org/system/files/2020-10/still-one-earth-precautionary-principle.pdf>
 - Sunstein, C. (2002-3). *The Paralyzing Principle*: <https://www.cato.org/sites/cato.org/files/serials/files/regulation/2002/12/v25n4-9.pdf>

- David Victor, et al. (2021). *Inviting Danger*. https://www.brookings.edu/wp-content/uploads/2021/03/Inviting_Danger_FINAL.pdf (executive summary, 1-5)
- **Skim/Optional:**
 - Gautam Naik, S&P (2021). *Problematic Corporate Purchases of Clean Energy Credits Threaten Net Zero Goals*: <https://www.spglobal.com/esg/insights/problematic-corporate-purchases-of-clean-energy-credits-threaten-net-zero-goals> (refresh, following original read in Class 8).
- **Exercise:**
 - Lobby day and renewable portfolio standards

PART 4: ALLOCATING RISK

April 11 (Class 12): Insurance, risk transfer, and risk allocation

Class Twelve covers best-practice and idealized approaches to the allocation of risk -- as well as cases where allocation of risk can go awry.

- **Read:**
 - Bridget Pals, et al. (2021). *Climate change comes to insurance*. <https://thehill.com/opinion/energy-environment/584240-climate-change-comes-to-insurance/>
 - Michael Panfil et al. (2021). *Extreme weather is a climate change inevitability; our responses shouldn't worsen the problem*. <https://thehill.com/opinion/energy-environment/580061-extreme-weather-is-a-climate-change-inevitability-our-responses/>
 - Brad Plumer et al. (2020). *How Decades of Racist Housing Policy Left Neighborhoods Sweltering*: <https://www.nytimes.com/interactive/2020/08/24/climate/racism-redlining-cities-global-warming.html>
- **Skim/Optional:**
 - New York Department of Financial Services (2021). *Guidance for New York Domestic Insurers on Managing the Financial Risks from Climate Change*. https://www.dfs.ny.gov/system/files/documents/2021/11/dfs-insurance-climate-guidance-2021_1.pdf
- **Exercise:**
 - Allocating risks of climate change

April 18 (Class 13): Presentations

April 25 (Class 14): Presentations