Course Overview

We begin by introducing the linkages between the environment and the economy. We discuss methods by which aggregate resource allocation decisions occur in capitalist economies, with implications for social welfare and economic efficiency. We briefly discuss the policy and welfare implications of perfectly competitive markets that represent an idealized analytical benchmark. We then analyze markets where the benchmark assumptions do not hold. We see how a laissez-faire approach leads to inefficient outcomes in the presence of “market failures” such as monopoly power, externalities, and public goods.

We discuss the appropriateness of various public policy options (taxes, subsidies, regulations, public provision of goods and services) to correct these failures. We examine practical steps in the implementation of these tools by studying environmental valuation techniques and cost-benefit analysis. We examine "government failure" to consider the limits of regulatory intervention arising from asymmetric information and the limitations of political economy.

We then analyze more sophisticated regulatory approaches that consider information problems. We also study the possibilities for sustainability that arise from corporate social responsibility. We examine basic techniques of renewable and non-renewable resource management. We analyze the implications of risk management methods for resource allocation.

Learning Objectives

Economics of Sustainability Management teaches students to use an economic framework to analyze environmental decision-making. Students will be expected to understand, intelligently apply and critique basic microeconomic tools that inform environmental problems. By the end of the semester, students will be expected to use economic concepts fluently to recommend or critique actual environmental decisions. Throughout the semester, concepts and metrics from microeconomic theory, capital budgeting, game theory, information economics and risk management will be utilized.

Readings


The Kolstad textbook is required for the course.

The Keohane & Olmstead textbook is optional for the course.

In addition, the course material will draw on other textbooks, articles and other readings listed/provided in Canvas.

Other potentially useful resources [I can provide some more guidance if needed]:

Microeconomics Background
If you need a relatively basic refresher of microeconomics principles, please consult Khan Academy as a baseline:

https://www.khanacademy.org/economics-finance-domain/microeconomics

MIT’s open courseware allow everyone to access materials on a variety of economics issues:

https://ocw.mit.edu/courses/economics/index.htm

Wide ranging coverage of economics issues can also be found in this CORE online publication:

https://www.core-econ.org/the-economy/

In addition, many standard microeconomics textbooks will work as review materials.
Master of Science in Sustainability Management

Environmental Economics & Sustainability

There are numerous useful resources that might be helpful especially if you have not been exposed to some of the topics previously. Here is a selection:


In addition, the course will draw on texts, articles, and other readings on reserve or on Canvas.

Resources

Columbia University Library
Columbia’s extensive library system ranks in the top five academic libraries in the nation, with many of its services and resources available online: http://library.columbia.edu/.

SPS Academic Resources
The Office of Student Affairs provides students with academic counseling and support services such as online tutoring and career coaching: http://sps.columbia.edu/student-life-and-alumni-relations/academic-resources.

Course Requirements (Assignments)

Regular attendance and active participation in class are required. Students are expected to have done the readings for each lecture before class. Participation will account for 10% of the final grade. Students will be required to contribute to class discussions. Contributing to class discussions means enhancing the quality of the class experience for yourself and others. It involves making relevant, useful, and non-obvious comments, or posing pertinent questions, in clear and succinct language. In addition, every student is required to report on an economic highlight of the week [a 3-minute presentation on an economic news item].

We will try to record each lecture via Zoom. But this is a course that requires in-person attendance. In case of an emergency, you will be able to attend virtually or view the lecture afterwards. You must make sure to email the professor and TA, letting them know that you will not be in class.

Problem sets/homework (5) account for 25% of the final grade. Students are required to form teams of 3-4 to work together and turn in the assignments. Except under extenuating circumstances, students are expected to remain in the same problem set team for the entire semester. Homework will be distributed at least one week before they are due. Please submit your answers electronically in Canvas.

There are two exams: a midterm and a final exam (30% combined of the final grade). The exams will be held remotely.

There is a team project on the economics of a current environmental policy problem. The presentation and written report constitute 35% of the final grade. Details regarding topics for team presentations will be provided later in the semester. Team composition for the presentation will be based on topic preferences, and students will be able to choose their own teams.

You can utilize the discussion forum feature in Canvas to communicate with your team members about the problem sets and the final paper/presentation. In addition, you can utilize a discussion thread to exchange information, post comments, and ask questions involving everyone else. However, there is no graded component to Canvas discussion.
Master of Science in Sustainability Management

Evaluation/Grading

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Participation [In-class &amp; 3-minute presentation]</td>
<td>10%</td>
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<tr>
<td>Homework [5 assignments]</td>
<td>25%</td>
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<tr>
<td>Midterm exam</td>
<td>15%</td>
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<tr>
<td>Final Exam</td>
<td>15%</td>
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<tr>
<td>Group Presentation</td>
<td>10%</td>
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<tr>
<td>Group Paper</td>
<td>25%</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
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Late assignment penalty: Students are expected to submit all their work on time and via Canvas. **There will be a 10% grade deduction for all work submitted late.**

FINAL GRADING SCALE

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<tr>
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<th>Percentage</th>
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<tbody>
<tr>
<td>A+</td>
<td>98–100 %</td>
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<td>A</td>
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<tr>
<td>C+</td>
<td>77–79.9 %</td>
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<td>C</td>
<td>73–76.9 %</td>
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<tr>
<td>C-</td>
<td>70–72.9 %</td>
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<tr>
<td>D</td>
<td>60–69.9 %</td>
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<tr>
<td>F</td>
<td>59.9% and below</td>
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Course Policies

Citation & Submission
All written assignments must use an acceptable academic formatting standard, cite sources, and be submitted to the course website (not via email).

Statement permitting AI Usage with Considerations
AI generative or machine learning tools can be used to assist with course deliverables, provided that all utilized information is cited in accordance with program guidelines. In addition, note that information produced by AI generative tools may be inaccurate or outdated. Please speak with your instructor if you have questions about course specific policies relating to usage of AI generative tools.

School Policies

Copyright Policy
Please note—Due to copyright restrictions, online access to this material is limited to instructors and students currently registered for this course. Please be advised that by clicking the link to the electronic materials in this course, you have read and accept the following:

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials. Under certain conditions specified in the law, libraries and archives are authorized...
Master of Science in Sustainability Management

to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be "used for any purpose other than private study, scholarship, or research." If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that user may be liable for copyright infringement.

Academic Integrity
Columbia University expects its students to act with honesty and propriety at all times and to respect the rights of others. It is fundamental University policy that academic dishonesty in any guise or personal conduct of any sort that disrupts the life of the University or denigrates or endangers members of the University community is unacceptable and will be dealt with severely. It is essential to the academic integrity and vitality of this community that individuals do their own work and properly acknowledge the circumstances, ideas, sources, and assistance upon which that work is based. Academic honesty in class assignments and exams is expected of all students at all times.

SPS holds each member of its community responsible for understanding and abiding by the SPS Academic Integrity and Community Standards posted at http://sps.columbia.edu/student-life-and-alumni-relations/academic-integrity-and-community-standards. You are required to read these standards within the first few days of class. Ignorance of the School's policy concerning academic dishonesty shall not be a defense in any disciplinary proceedings.

School Policies and Expectations:

Accessibility Statement – I want you to succeed in this course. Contact disability@columbia.edu for learning accommodations.

Names/Pronouns – You deserve to be addressed in a manner that reflects your identity. You are welcome to tell me your pronoun(s)and/or name (if different from University records) at any time, either in person or via email.

Discrimination – We embrace the diversity of gender, gender identity & expression, sex, sexual orientation, race, ethnicity, national origin, age, religion, disability status, family status, socioeconomic background, and other visible and non-visible identities. Columbia University does not tolerate unlawful discrimination, discriminatory harassment, sexual assault, domestic violence, dating violence, stalking, or sexual exploitation and all such conduct is forbidden by Columbia University Policy.

Duty to Report – You deserve a University community free from discrimination, harassment, and gender-based misconduct including sexual harassment, sexual assault, domestic and dating violence, stalking, and sexual exploitation. It is therefore University policy to require Columbia faculty and staff to report to EOAA any instance or allegation of prohibited conduct involving any undergraduate or any graduate student that is disclosed to, observed by, or otherwise known to that employee. This requirement to report is in place to help ensure that students are provided appropriate resources and to allow the University to mitigate harm to our community.

Confidential Resources - There are confidential resources on campus who do not have a Duty to Report, including:

- Sexual Violence Response & Rape Crisis/Anti-Violence Support Center (SVR)
- Ombuds Office
- Medical Services
- University Counseling and Psychological Services
- University Pastoral Counseling
- Columbia Office of Disability Services

University employees working in a confidential capacity will not report information shared with them.
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Inclusion
In the M.S. in Sustainability Management program, faculty and staff are committed to the creation and maintenance of “inclusive learning” spaces – classrooms and other places of learning where you will be treated with respect and dignity, and where all individuals are provided equitable opportunity to participate, contribute, and succeed.

Diversity
It is our intent that students from all diverse backgrounds and perspectives be well-served by this course, that students’ learning needs be addressed both in and out of class, and that the diversity that the students bring to this class be viewed as a resource, strength and benefit. It is our intent to present materials and activities that are respectful of diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture.

Accessibility
Columbia is committed to providing equal access to qualified students with documented disabilities. A student’s disability status and reasonable accommodations are individually determined based upon disability documentation and related information gathered through the intake process. For more information regarding this service, please visit the University's Health Services website: http://health.columbia.edu/services/ods/support.
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Course Schedule/Course Calendar

Most readings will be posted as pdf files in the weekly folders. Some changes to these anticipated readings or the course schedule in general might be made based on student interest and course progress.

<table>
<thead>
<tr>
<th>Session 1</th>
<th>September 11</th>
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<tbody>
<tr>
<td>Topic:</td>
<td></td>
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<tr>
<td>• Introduction</td>
<td></td>
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<tr>
<td>• Economy-environment interactions</td>
<td></td>
</tr>
<tr>
<td>• What is economics? What is environmental economics?</td>
<td></td>
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<tr>
<td>• What is sustainable development vs. sustainability management?</td>
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</tr>
<tr>
<td>Anticipated Readings:</td>
<td></td>
</tr>
<tr>
<td>• CDK Chapters 1 &amp; 2</td>
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<tr>
<td>• Daly, Herman E. &quot;Introduction: The Shape of Current Thought on Sustainable Development.&quot; In Beyond Growth, 1-23. Boston: Beacon.</td>
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<table>
<thead>
<tr>
<th>Session 2</th>
<th>September 18</th>
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<tbody>
<tr>
<td>Topic:</td>
<td></td>
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<tr>
<td>• Review of Microeconomics</td>
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<tr>
<td>• Law of Demand &amp; Supply</td>
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<tr>
<td>• Elasticity</td>
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<tr>
<td>• Market Structures</td>
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<tr>
<td>• Profit maximization</td>
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<tr>
<td>• Financial concepts: NPV, Time value of money</td>
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<tr>
<td>• Regression analysis</td>
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<tr>
<td>Anticipated Readings:</td>
<td></td>
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<tr>
<td>• Any introductory microeconomics text, lecture notes from previous courses. Please check the Readings section of the syllabus. I am also making the pdf file of a Microeconomics textbook available in Canvas.</td>
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<tr>
<td>Comment: The intent of this lecture is to revisit microeconomic and financial principles that will be applied throughout the semester. If you have any questions about basic issues, please make sure to ask them here.</td>
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<table>
<thead>
<tr>
<th>Session 3</th>
<th>September 25</th>
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<tbody>
<tr>
<td>Topic:</td>
<td></td>
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<tr>
<td>• Social choice, efficiency, and markets</td>
<td></td>
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<tr>
<td>• Efficiency and market equilibrium</td>
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<tr>
<td>• The power of markets and the First Welfare Theorem</td>
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<tr>
<td>• Market failure</td>
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<tr>
<td>Required Readings:</td>
<td></td>
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<tr>
<td>• CDK Chapters 3, 4 &amp; 5</td>
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</tbody>
</table>

Assignments Due:
| • Assignment 1 |
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**Session 4**

**October 2**

**Topic:**
- Environmental Valuation
- Environmental Demand theory

**Required Readings:**
- CDK Chapters 7 & 8

**Assignments Due:**
- Assignment 2

**Session 5**

**October 9**

**Topic:**
- Environmental Valuation [continued from Session 4]
- Demand theory [continued from Session 4]
- Revealed preference vs. Stated preference

**Required Readings:**
- CDK Chapters 10

**Assignments Due:**
- Assignment 3

**Session 6**

**October 16**

**Topic:**
- Cost-Benefit Analysis
- Discounting & inter-temporal decision-making

**Required Readings:**
- CDK Chapter 6

**Session 7**

**October 23**

**Topic:**
- Risk and Uncertainty
Master of Science in Sustainability Management

- Probability
- Property Rights and Resource Management
- The Tragedy of the commons

Required Readings:
- CDK Chapter 18

Assignments Due:
- Midterm Exam

**Session 8**
October 30

Topic:
- The Coase theorem
- Pigouvian Taxes & Marketable Permits

Required Readings:
- CDK Chapter 12 & 13

**Session 9**
November 13

Topic:
- Climate Economics
- Cap and Trade, Carbon Tax, and Social Cost of Carbon
- Environmental Kuznets Curves

Required Readings:
- CDK Chapter 14 & 15

Assignments Due:
- Assignment 4

**Session 10**
November 20

Topic:
- Information Problems
- Asymmetric information: moral hazard & adverse selection
- Regulation & Government Failure
Master of Science in Sustainability Management

- Information aggregation
- Regulatory capture

Required Readings:
- CDK Chapter 11 & 16

Assignments Due:
- Assignment 5

Session 11  November 27

Topic:
- Porter Hypothesis, CSR, ESG, & SRI

Required Readings:
- CDK Chapter 17

Session 12  December 4

Topic:
- Macroeconomic Sustainability & Limits to Growth?
- Course Summary
- Student Presentations

Assignments Due:
- Group Presentation

Session 13  December 11

Topic:
- Course Summary
- Student Presentations

Assignments Due:
- Group Project & Presentation
- Final Exam
Master of Science in Sustainability Management  
**SUMA K4190: Economics of Sustainability Management**  
**Tuesday, 6:10-8:00 pm**  
**Credits: 3**  

**Instructor:** Amin Mohseni-C, Ph.D.; 301-503-5839; am6158@columbia.edu  
**Faculty Support Assistant:** Sanjana Asnani, sha2143@columbia.edu  
**Office Hours:** Tuesdays 4-6 pm or by appointment. Please coordinate beforehand.  
**Response Policy:** Email is preferred. If urgent, contact me via cell phone.

**Course Overview**  
We begin by introducing the linkages between the environment and the economy. We discuss methods by which aggregate resource allocation decisions occur in capitalist economies, with implications for social welfare and economic efficiency. We briefly discuss the policy and welfare implications of perfectly competitive markets that represent an idealized analytical benchmark. We then analyze markets where the benchmark assumptions do not hold. We see how a laissez-faire approach leads to inefficient outcomes in the presence of "market failures" such as monopoly power, externalities, and public goods.

We discuss the appropriateness of various public policy options (taxes, subsidies, regulations, public provision of goods and services) to correct these failures. We examine "government failure" to consider the limits of regulatory intervention arising from asymmetric information and the limitations of political economy.

We then analyze more sophisticated regulatory approaches that consider information problems. We also study the possibilities for sustainability that arise from corporate social responsibility. An overview of the energy market and energy economics is presented. We analyze the implications of risk management methods for resource allocation. We cover the basics of environmental valuation techniques and cost-benefit analysis.

**Learning Objectives**  
Economics of Sustainability Management teaches students to use an economic framework to analyze environmental decision-making. Students will be expected to understand, intelligently apply, and critique basic microeconomic tools that inform environmental problems. By the end of the semester, students will be expected to analyze macro policies as they related to energy markets and environmental issues and use economic concepts fluently to recommend or critique actual environmental decisions.

**Readings**  
The Kolstad textbook is required for the course. In addition, the course material will draw on other textbooks, articles and other readings listed/provided in Canvas.

Other potentially useful resources [I can provide some more guidance if needed]:

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Course Requirements (Assignments)

Participation will account for 10% of the final course grade. Regular attendance and active participation in class are required. Students are expected to have done the readings for each lecture before class. Students will be required to contribute to class discussions. Contributing to class discussions means enhancing the quality of the class experience for yourself and others. It involves making relevant, useful, and non-obvious comments, or posing pertinent questions, in clear and succinct language. One element of class participation that students are encouraged to pay particular attention to is highlighting and discussing relevant events, news articles, and reports that students come across on weekly basis in their readings.

Reading Discussion Leadership for 5% of the final course grade: Starting week 5, students will be required to lead the discussion on the readings assigned for a particular week (articles and not the textbook readings). This will be in the form of 20 minutes of summarizing and critiquing the readings while engaging the students in the discussion.

Problem sets/homework assignments account for 25% of the final course grade. Students are required to form teams of 3 to work together and turn in the assignments. Except under extenuating circumstances, students are expected to remain on the same team for the entire semester. Homework will be distributed at least one week before it is due. Please submit your answers electronically on Canvas.

There is one midterm exam (25% of the final course grade). The exam may be held during class time or remotely.

There is a team project on the economics of a current environmental policy problem. The presentation and written report constitute 35% of the final course grade. Details regarding topics for team presentations will be provided later in the semester. Team composition for the presentation will be based on topic preferences and may differ from the problem-set teams.

You can utilize the discussion forum feature in Canvas to communicate with your team members about the problem sets and the final paper/presentation. In addition, you can utilize a discussion thread to exchange information, post comments, and ask questions involving everyone else. However, there is no graded component to Canvas discussion.

Evaluation/Grading

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Participation</td>
<td>10%</td>
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<tr>
<td>Reading presentation</td>
<td>5%</td>
</tr>
<tr>
<td>Group Problem Sets/Homework</td>
<td>25%</td>
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<tr>
<td>Midterm</td>
<td>25%</td>
</tr>
<tr>
<td>Group Presentation</td>
<td>10%</td>
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<tr>
<td>Group Paper</td>
<td>25%</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
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Master of Science in Sustainability Management

Students are expected to submit all their work on time and via Canvas. If you expect to miss a particular deadline, please communicate that in advance. Depending on the circumstances, late assignments might or might not be accepted. Hence, please make sure to let me and the TA informed of any late submissions in advance.

**FINAL GRADING SCALE**

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<tr>
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Master of Science in Sustainability Management

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In our classroom, all students are welcome regardless of race/ethnicity, gender identities, gender expressions, sexual orientation, socio-economic status, age, disabilities, religion, regional background, Veteran status, citizenship status, nationality and other diverse identities that we each bring to class.

Accessibility

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Master of Science in Sustainability Management

Course Schedule/Course Calendar

Most readings will be posted as pdf files in the weekly folders. Some changes to these anticipated readings or the course schedule, in general, might be made based on student interest and course progress.

Week 1

January 17

Topic:

- Introduction
- Economy-environment interactions
- What is economics? What is environmental economics?
- How economic thinking works?

Required Readings:

- CDK Chapters 1 & 2

Weeks 2, 3, and 4

January 24 - Feb 7

Topic:

- Review of Microeconomics
- Law of Demand & Supply
- Elasticity
- Market Structures
- Profit maximization
- Financial concepts: NPV, Time value of money
- Efficiency and market equilibrium
- Externalities and Market Failure

Required Readings:

- CDK Chapters 3, 4 & 5

Assignments Due:

- Assignment 1 (week 3 on January 31st)

Week 5 - NO CLASS

February 14
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Week 6  February 21

Topic:
- Environmental Valuation
- Environmental Demand theory
- Revealed preference vs. Stated preference

Required Readings:
- CDK Chapters 7, 8, and 10

Assignments Due:
- Assignment 2 (February 24)

Week 7  February 28

Topic:
- Cost-Benefit Analysis
- Discounting & inter-temporal decision-making

Required Readings:
- CDK Chapter 6
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Week 8

March 7

Topic:

● Risk and Uncertainty

Required Readings:

● CDK Chapter 18

Assignments Due:

● Midterm (Due March 10)

Spring Break

March 13-17

Week 9

March 21

Topic:

• Property Rights and Resource Management
• The Coase theorem
• The Tragedy of the commons
• Investment decision-making
• Pigouvian Taxes & Marketable Permits

Required Readings:

● CDK Chapter 12 & 13
● McAfee, R.Preston and Tracy Lewis. “Investment” in Introduction to Economic Analysis, Chapter 11.

Week 10

March 28

Topic:

● Externalities, regulations, taxes, and cap & trade
● Environmental Kuznets Curves

Required Readings:

● CDK Chapter 14 & 15

Assignments Due:

● Assignment 3 (March 31)
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Weeks 11 and 12

Topic:
- Energy markets & economics
- Energy transition

Required Readings:
- Will be posted soon.

Week 13

Topic:
- Porter Hypothesis, CSR & SRI
- Macroeconomic Sustainability
- Limits to Growth?

Required Readings:
- CDK Chapter 17

Assignments Due:
- Assignment 4 (Due April 21)

Week 14

Assignments Due:
- Group Project Presentations
- Group Papers Due (During Exam week May 5 -12, Final date TBD)