



Course Syllabus
EE 376 Economics of Climate Change
Semester 1/2021

Number of credits: 3 credits
Prerequisites: EE 210 or EE 211 or EE 213

Hours: Wednesday and Friday, 14.00-15.30
Lecture Venue: Zoom Meeting: Meeting ID: 988 5199 7430, Passcode: 841226

Instructor: Assoc. Prof. Chayun Tantivasadakarn
Email [chayunt@econ.tu.ac.th]
Office: Room# 8 the 60th Anniversary Building
Office hour: Wednesday and Friday 13:00 – 14:00

Moodle enrolment key:

Course Description:

Basic concepts of climate change relating to environmental economics, efficiency, externalities, and policy instruments. The role of economics in the formation of climate policy. Economic problems of climate change, such as intertemporal decisions, impacts of climate change, cost of mitigation, and adaptation. Thailand and international cooperation and debate in climate policy.

Lecture Schedule

Date	Topics
1-2	<p>1. Introduction to Climate Change Science</p> <ul style="list-style-type: none"> • The Earth's climate system • Greenhouse gas (GHGs), global energy balance, and the greenhouse effect • Important GHGs: CO₂ and carbon cycles, other GHGs • Dissenting opinions: the great hoax? <p>Reading: H Ch. 1-4, T Ch. 1, Nordhaus Ch.5, 13-14, 24-25, Incropera Ch. 2-6, 9.</p>
Aug 11-13, 2021	
3-4	<p>2. Anthropogenic global warming and consequences</p> <ul style="list-style-type: none"> • GHGs concentration and global temperature • Impacts, damages and losses of CC • GHGs data and information • GHGs emission by countries • Share of mitigation responsibility for climate stability <p>Reading: H Ch. 6-7, Incropera Ch. 5, T Ch. 2, IPCC (2013a), Stern Ch. 3-6</p>
Aug 18-20, 2021	
5-6	<p>3. Climate Change and Market Failure</p> <ul style="list-style-type: none"> • Externalities and carbon pricing • Global commons and Tragedy of Commons • The under provisioning of Public Goods <p>Reading: HR Ch. 3-4, T Ch. 3</p>
Aug 25 - 27, 2021	
7-9	<p>4. Carbon Taxes</p> <ul style="list-style-type: none"> • Optimum emission • Correction market failure with carbon <ul style="list-style-type: none"> ○ Single source ○ Multiple sources • Pros and cons of carbon taxes • Carbon tax research <p>Reading: HR Ch. 16, T Ch. 4, Pearce, David (1991) pp. 938-948.</p>
Sep 1-8, 2021	
10 - 12	<p>5. Carbon Market or Cap-and-Trade</p> <ul style="list-style-type: none"> • Definition and concept of Carbon market

Date	Topics
Sep 10-17, 2021	<ul style="list-style-type: none"> • Demand and supply of carbon credits <ul style="list-style-type: none"> ○ Deriving the demand and supply for carbon credits ○ Factors influencing the demand and supply ○ Carbon market equilibrium • Choices of carbon credits allocation and efficiency • Comparison of carbon market and carbon tax • Carbon market research <p>Reading: HR Ch. 16, T Ch. 5</p>
13-14	<p>6. Technological Development Policy and mitigation</p> <ul style="list-style-type: none"> • Why do mitigation technology grow so slow? • Technology-push vs. Demand-pull debate • Policy for inducing technological change • Costs of low carbon technology and mitigations <p>Reading: Grubb, M. (2004), Goulder and Schneider (1999), T Ch. 5</p>
Sep 22 - 24, 2021	
Midterm exam: Friday October 1, 2021, 12:00 – 14:00	
15-16	<p>7. Global Institutions: Kyoto Protocol and Post-Kyoto</p> <ul style="list-style-type: none"> • The Intergovernmental Panel on Climate Change (IPCC) • The United Nations Framework Convention on Climate Change (UNFCCC) • Kyoto Protocol • ‘Annex-I’ vs. ‘Non-Annex-I’ countries • Emissions Trading Scheme (ETS), Joint Implementation (JI), and Clean Development Mechanism (CDM) Cooperation failure? • Paris Agreement <p>Reading: Incropera Ch. 8, T Ch. 5</p>
Oct 6 - 8, 2021	
17-20	<p>9. International Trade and Climate Change</p> <ul style="list-style-type: none"> • Mitigation & competitiveness • Carbon offshoring and Carbon leakages

Date	Topics
Oct 13-20, 2021	<ul style="list-style-type: none"> • Concepts about GHGs responsibility <ul style="list-style-type: none"> ◦ Production-based and consumption-based responsibility • Carbon leakages and Border-Carbon Adjustment (BCAs) <ul style="list-style-type: none"> ◦ Pros and cons of BCAs • World Trade Organization (WTO) and Climate Change <p>Reading: Incropera Ch. 8, T Ch. 8-9</p>
20-22	<p>7. Economic Concepts (III): Social Costs of Climate Change</p> <ul style="list-style-type: none"> • Cost-Benefit Analysis (CBA) concept • Social discount rates • Economic assessment of the damages caused by global warming
Oct 27, 2021 – Nov 3, 2021	<ul style="list-style-type: none"> • The Stern’s Review • The Nordhaus DICE model • Stern vs. Nordhaus debates <p>Reading: FF Ch.6, Stern Ch.6, 9, 12, Nordhaus Ch.15-16, 18</p>
23-24	<p>8. Economics of Climate Change Adaptation</p> <ul style="list-style-type: none"> • Climate risks
Nov 5-10, 2021	<ul style="list-style-type: none"> • Climate change adaptation • Economics of technology & adaptation <p>Reading: Stern Ch.5, 18-20, OECD (2015)</p>
25 -27	<p>10. Climate Change and Economic Sectors</p> <ul style="list-style-type: none"> • Fossil fuel vs. renewable energy • Carbon sink
Nov 12-19, 2021	<ul style="list-style-type: none"> • Carbon offsets • REDD+ • Demand management
27-28	
Nov 24-26, 2021	<p>14. Group project presentation</p>
	<p>Midterm exam: Wednesday October 1, 2021, 13:30 – 16:00</p>

Evaluation

Midterm Examination	35%
Final Examination	35%
Group project or reports	15%
Assignment and participation	15%

Group project (15 points): maximum 3 member/group

- Design and print an **A0-sized academic poster** linking climate change issue with a selected topic from the following list. A poster may have a free-style title, but must be informative and comprehensive in its content, and contain some constructive arguments in the analytical part.

Topic lists:

Electrical vehicle	Agriculture	Public Transportation	Biotechnology
Solar energy	Fishery	Financial sector	Gender
Hydropower	Livestock	Biodiversity	Poverty
Bio fuel	Energy-intensive industry	Coastal adaptation	Youth
Nuclear power	Real estate	Draught management	Disaster
Wind energy	Aviation	Waste management	Arts and Culture
Risk management	Tourism related services	Disaster management	IT and AI

Evaluation will be based on the ability to arrange data and information with proper visualization and citation, presenting sharp arguments (concise and interesting leading questions and the existing conflicts of viewpoint relevant to the chosen topic) linking the topic with **the economics of climate change mitigation and/or adaptation**, attractive and reader-friendly poster design. The total mark will come from peer evaluation (7 marks) and instructor evaluation (8 marks)

Your oral presentation would take 12 minutes (without any note!) and 3 minutes of Q&A.

Submission date of selected topic:	October 6, 2021
Submission date of the outline:	October 20, 2021
Presentation dates:	November 24 – 26, 2021

Note: Please be strictly aware of '*plagiarism rule*' which could bring a zero score for violators.

Reading lists

- [T] Tantivasadakarn, Chayun (2019) *Economics of Climate Change* (in Thai), Thammasat University Press.
- [FF] Field, B., & Field, M. (2017). *Environmental economics: An introduction* (Seventh ed.). New York, NY: McGraw-Hill Education.
- Grubb, M. (2004). "Technology Innovation and Climate Change Policy: an overview of issues and options." *Keio Economic Studies*, 41(2): 103-132.
- Goulder, L.H., and S.H. Schneider (1999) 'Induced Technological Change and the Attractiveness of CO₂ Abatement Policies,' *Resource and Energy Economics*, Vol. 21, pp. 211-53.
- [HR] Harris, J. M., & Roach, B. (2017). *Environmental and natural resource economics: A contemporary approach*. Routledge.
- [H] Houghton, John (2004) *Global Warming: The Completer Briefing*, 3rd edition, Cambridge University Press.
<http://www.gci.org.uk/Documents/Global-Warming-the-Complete-Briefing.pdf>
- [Incropera] Incropera, F. P. (2016). *Climate change: a wicked problem: complexity and uncertainty at the intersection of science, economics, politics, and human behavior*. Cambridge University Press. (ห้องสมุดปริทัศน์)
- IPCC (2013a) Summary for Policymakers. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)].
- Milton, E.J., and Euston Quah (2021) *Cost-Benefit Analysis*, Routledge.
- Nordhaus, W. D. (2007). A review of the Stern review on the economics of climate change. *Journal of economic literature*, 45(3), 686-702.
- [Nordhaus] Nordhaus, W. D. (2013). *The climate casino: Risk, uncertainty, and economics for a warming world*. Yale University Press.
- Pearce, David (1991), "The Role of Carbon Taxes in Adjusting to Global Warming," *The Economic Journal*, Vol. 101, No. 407, (Jul., 1991), pp. 938-948.
- [Stern] Stern, N., & Stern, N. H. (2007). *The economics of climate change: the Stern review*. Cambridge University press.
- [TT] Tietenberg, T. H., & Lewis, L. (2016). *Environmental and natural resource economics*. Routledge.

Additional links:

Glossary terms: https://archive.ipcc.ch/pdf/special-reports/srex/SREX-Annex_Glossary.pdf

Gas Emissions by Countries and Sectors:

<https://www.wri.org/blog/2020/02/greenhouse-gas-emissions-by-country-sector>

Global emission: <https://www.c2es.org/content/international-emissions/>

NASA: <https://climate.nasa.gov/evidence/>

CONTACT INFORMATION

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