



Course Syllabus
EE 376 Economics of Climate Change
Semester 2/2024

Lecture Time: Monday, 9:00-12:00
Lecture Venue Room 203, 2nd floor, Faculty of Economics
Teaching Materials Platform: Facebook Group "EE376 2023-2"
<https://www.facebook.com/groups/1095046038349270>

Instructor: **Name:** Assoc. Prof. Chayun Tantivasadakarn
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Office: Room # 8 the 60th Anniversary Building
Office hour: Wednesday and Friday, 13:30 – 14:30

Moodle enrolment key:
Number of credits: 3 credits
Prerequisites: EE 210 or EE 211 or EE 213

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.

Course Objectives:

Students will be equipped with the basic principle of climate change science and its linkages and impacts to the economy including the economic knowledge and analytical skills to assess the economic implications of climate change, evaluate policy options for climate mitigation and adaptation.

Expected Learning Outcomes

1. Morality and Ethics EE376

Applicability	Expected Learning Outcomes	Evaluation Method
●	1. Students demonstrate integrity.	Quizzes and assignments
●	2. Students prioritize social and public benefits over personal ones.	
●	3. Students are punctual and comply with the code of conduct of the institution and society at large.	
●	4. Students are responsible and accountable to society, the nation, and the subject of economics.	
●	5. Students realize the cultural and environmental value of a sustainable society.	

2. Knowledge

Applicability	Expected Learning Outcomes	Evaluation Method
●	1. Students know and understand modern economics principles and theories, and are up to date with new developments.	Quizzes, assignments, and exam
●	2. Students know and understand Thai and global economic structure and the importance of major international economic events.	
○	3. Students know and understand the instruments of economic analysis.	
●	4. Students know and understand applied fields in economics, including monetary, public, international, business, natural resource, and environmental, industrial, agricultural, cooperative, political, developmental, and	

	entrepreneurial economics as well as agribusiness.	
●	5. Students are informed about related fields including sociology, business administration, education, law policy, and science.	

3. Intellectual Development

Applicability	Expected Learning Outcomes	Evaluation Method
●	1. Students have developed individual critical thinking.	Group project
●	2. Students are sufficiently trained in research skills.	
●	3. Students demonstrate an ability to analyze and synthesize data, as well as appropriately integrate economics concepts to understand the causes of current economic problems in Thailand. Based on analysis and synthesis, students demonstrate an ability to propose policy guidelines to resolve problems.	

4. Interpersonal Skills and Responsibilities

Applicability	Expected Learning Outcomes	Evaluation Method
●	1. Students are responsible for assigned tasks and work in groups effectively.	Group project
●	2. Students have problem-solving skills.	
○	3. Students show leadership skills and team spirit.	
●	4. Students are always improving themselves.	

○	5. Students have good interpersonal skills, adapt, and work under different conditions.	
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5. Quantitative Analysis, communication, and information technology

Applicability	Expected Learning Outcomes	Evaluation Method
○	1. Students select and apply appropriate statistical and mathematical methods for data processing, interpretation, conclusions, and recommendations to resolve problems.	Assignments
○	2. Students communicate effectively and select appropriate presentation methods.	Group project
○	3. Students use information and communication technologies appropriately to gather data as well as process, interpret, and present results.	

Remark: ● Primary expected outcome ○ Secondary expected

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 (2023) 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/>

Lecture Schedule

Date	Topics
1	<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
Jan 8, 2024	<ul style="list-style-type: none"> • 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>
2	<p>2. Anthropogenic global warming and consequences</p> <ul style="list-style-type: none"> • GHGs concentration and global temperature

Date	Topics
Jan 15, 2024	<ul style="list-style-type: none"> • 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>
3	<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
Jan 22, 2024	<p>Reading: HR Ch. 3-4, T Ch. 3</p> <p>Exercise 1: topic #1 and #2</p>
4	<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
Jan 29, 2024	<p>Reading: HR Ch. 16, T Ch. 4, Pearce, David (1991) pp. 938-948.</p> <p>Exercise 2: topic #3</p>
5-6	<p>5. Carbon Market or Cap-and-Trade</p> <ul style="list-style-type: none"> • Definition and concept of Carbon market • 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
Feb 5-12, 2024	<p>Reading: HR Ch. 16, T Ch. 5</p>
7	<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
Feb 17, 2024	<p>Reading: Grubb, M. (2004), Goulder and Schneider (1999), T Ch. 5</p> <p>Quiz 1: topic #4</p>

Date	Topics
8	7. Carbon Labeling <ul style="list-style-type: none"> • Life cycle assessment (LCA) • What is carbon labelling? • Economics of carbon labelling • Types of carbon labelling • Carbon labelling situation in other countries • Carbon labelling in Thailand
Feb 19, 2024	
	Midterm: Monday, March 4, 2024; 09:00-11:00 AM
9	8. Behavioral Economics and climate mitigation <ul style="list-style-type: none"> • Concept of nudge • Applications 9. Global Institutions: Kyoto Protocol and Post-Kyoto <ul style="list-style-type: none"> • The Intergovernmental Panel on Climate Change (IPCC) • The United Nations Framework Convention on Climate Change (UNFCCC) • Kyoto Protocol • Paris Agreement Reading: Incropera Ch. 8, T Ch. 5 Assignment: En-Roads model
Mar 11, 2024	
10-11	10. International Trade and Climate Change <ul style="list-style-type: none"> • Mitigation & competitiveness • Carbon offshoring and Carbon leakages • Concepts about GHGs responsibility <ul style="list-style-type: none"> ◦ Production-based and consumption-based responsibility • Carbon leakages and Border-Carbon Adjustment (BCAs) or Carbon-Border-Adjustment Measures (CBAM) <ul style="list-style-type: none"> ◦ Pros and cons of BCAs • World Trade Organization (WTO) and Climate Change Reading: Incropera Ch. 8, T Ch. 8-9 Exercise 3: Topic 9 Global Institutions
Mar 18, Mar 25, 2024	
12	11. Carbon Pricing and Competitiveness <ul style="list-style-type: none"> • Background • Objectives of the study

Date	Topics
Apr 1, 2024	<ul style="list-style-type: none"> • Scope of the study • GTAP-E model • Scenarios of the analysis • Economic impacts • Competitiveness impacts <p>Reading: Tantivasadakarn, Chayun; “Carbon Pricing and International Competitiveness for Thailand and ASEAN,” Thammasat Review of Economic and Social Policy, Vol. 6, No. 2, July-December, 2020.</p>
13	<p>12. Economics of Climate Change Adaptation</p> <ul style="list-style-type: none"> • Climate risks • Climate change adaptation • Cost-Benefit Analysis (CBA) concept • Social discount rates
Apr (TBA), 2024	<p>Reading: FF Ch.6 Stern Ch. 5,6, 9, 12, 18-20, Nordhaus Ch.15-16, 18</p>
14-15	<p>13. Group project presentation</p>
Apr 22, Apr 29, 2024	
	<p>Final exam: Tuesday, May 7, 2024; 9:00 – 12:00 AM</p>

Evaluation

Midterm Examination	35%
Final Examination	35%
Group project	15%
Exercises, Quizzes, and Assignment	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.

Suggested topic lists:

Charging stations for EV	Electric train system	Low carbon aviation	Industrial decarbonization
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Concentrating solar power	Climate-smart agriculture	Biotechnology for adaptation	Green financing
Pumped storage hydropower	Energy-intensive industry	Draught management	Food waste management
Bio fuel	Plant-based meat	Flood management	Forest management
Nuclear power	Coral reef restoration technology	Solid waste management	Smart Grid and Electricity Management Systems
Small wind turbine energy	Green city	Waste water management	Climate Justice and Equity Issues
Carbon Capture and Storage (CCS)	Low carbon tourism	Health Impacts of climate change	Climate Data and AI Applications for climate change

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**, cost effectiveness evaluation when applicable, attractive and reader-friendly poster design. The total mark will come from instructor evaluation (7 marks), peer evaluation (4 marks), and Facebook like and share (4 marks)

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

Submission date of selected topic: Mar 11, 2024
Submission date of the outline: Mar 18, 2024
Presentation dates: Apr 20, Apr 27, 2024

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

CONTACT INFORMATION

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