



### Course Syllabus

#### EE 376 Economics of Climate Change

Semester 1/2023 (August 15 - December 4, 2023)

**Lecture Time:** Monday, 09.00-12.00 hours

**Lecture Venue:** Room 206

Teaching Materials Platform: Facebook Group

<https://www.facebook.com/groups/143443555444313>

**Instructor:**

**Name:** Assoc. Prof. Dr. Chayun Tantivasadakarn

**Office:** Room# 8 the 60<sup>th</sup> Anniversary Building

**Office Hours:** Wednesday and Friday 13:30 – 14:30

**Email:** chayunt@econ.tu.ac.th

**Number of credits:** 3 credits (3-0-6)

**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.	
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### 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.	



Date	Topics
3	<b>3. Climate Change and Market Failure</b> <ul style="list-style-type: none"> <li>• Externalities and carbon pricing</li> <li>• Global commons and Tragedy of Commons</li> <li>• The under provisioning of Public Goods</li> </ul>
Sep 4, 2023	<b>Reading:</b> HR Ch. 3-4, T Ch. 3  <b>Quiz 2:</b> topic #3 (TBA)
4	<b>4. Carbon Taxes</b> <ul style="list-style-type: none"> <li>• Optimum emission</li> <li>• Correction market failure with carbon <ul style="list-style-type: none"> <li>○ Single source</li> <li>○ Multiple sources</li> </ul> </li> <li>• Pros and cons of carbon taxes</li> <li>• Carbon tax research</li> </ul>
Sep 11, 2023	<b>Reading:</b> HR Ch. 16, T Ch. 4, Pearce, David (1991) pp. 938-948.
5-6	<b>5. Carbon Market or Cap-and-Trade</b> <ul style="list-style-type: none"> <li>• Definition and concept of Carbon market</li> <li>• Demand and supply of carbon permits <ul style="list-style-type: none"> <li>○ Deriving the demand and supply for carbon permits</li> <li>○ Factors influencing the demand and supply</li> <li>○ Carbon market equilibrium</li> </ul> </li> <li>• Choices of carbon credits allocation and efficiency</li> <li>• Comparison of carbon market and carbon tax</li> <li>• Carbon market research</li> </ul>
Sep 18-25, 2023	<b>Reading:</b> HR Ch. 16, T Ch. 5  <b>Quiz 3:</b> topic #4 and #5 (TBA)  <b>6. Carbon Labeling</b> <ul style="list-style-type: none"> <li>• Life cycle assessment (LCA)</li> <li>• What is carbon labelling?</li> <li>• Economics of carbon labelling</li> <li>• Types of carbon labelling</li> <li>• Carbon labelling situation in other countries</li> <li>• Carbon labelling in Thailand</li> </ul>
Oct 2, 2023	<b>Midterm: Monday, Oct 2, 2023; 9:00 – 11:00 hrs.</b>

Date	Topics
7	<p><b>7. Technological Development Policy and mitigation</b></p> <ul style="list-style-type: none"> <li>• Why do mitigation technology grow so slow?</li> <li>• Technology-push vs. Demand-pull debate</li> <li>• Policy for inducing technological change</li> <li>• Costs of low carbon technology and mitigations</li> </ul> <p><b>Reading:</b> Grubb, M. (2004), Goulder and Schneider (1999), T Ch. 5</p> <p><b>Assignment:</b> En-Roads Simulation (TBA)</p>
Oct 9, 2023	
8	<p><b>8. Forestry and mitigation</b></p> <ul style="list-style-type: none"> <li>• Forest situation in Thailand</li> <li>• Examples of forest bonds in other countries</li> <li>• Proposed forest bond system for Thailand</li> </ul> <p><b>9. Behavioral Economics and climate mitigation</b></p> <ul style="list-style-type: none"> <li>• Concept of nudge</li> <li>• Applications</li> </ul> <p><b>Group project submission date</b></p>
Oct 16, 2023	
Oct 23, 2023	Chulalongkorn Day, no class
Oct 24, 2023	<b>Group project outline submission date</b>
9	<p><b>10. Global Institutions: Kyoto Protocol and Post-Kyoto</b></p> <ul style="list-style-type: none"> <li>• The Intergovernmental Panel on Climate Change (IPCC)</li> <li>• The United Nations Framework Convention on Climate Change (UNFCCC)</li> <li>• Kyoto Protocol</li> <li>• ‘Annex-I’ vs. ‘Non-Annex-I’ countries</li> <li>• Emissions Trading Scheme (ETS), Joint Implementation (JI), and Clean Development Mechanism (CDM)</li> <li>• Cooperation failure?</li> <li>• Paris Agreement</li> </ul> <p><b>Reading:</b> Incropera Ch. 8, T Ch. 5</p>
Oct 30, 2023	
10-11	<p><b>11. International Trade and Climate Change</b></p> <ul style="list-style-type: none"> <li>• Mitigation &amp; competitiveness</li> <li>• Carbon offshoring and Carbon leakages</li> <li>• Concepts about GHGs responsibility</li> </ul>

Date	Topics
Nov 6-13, 2023	<ul style="list-style-type: none"> <li>○ Production-based and consumption-based responsibility</li> <li>● Carbon leakages and Border-Carbon Adjustment (BCAs) or Carbon-Border-Adjustment Measures (CBAM) <ul style="list-style-type: none"> <li>○ Pros and cons of BCAs</li> </ul> </li> <li>● Carbon Pricing and Competitiveness</li> <li>● World Trade Organization (WTO) and Climate Change</li> </ul> <p><b>Reading:</b> Incropera Ch. 8, T Ch. 8-9</p> <p><b>Quiz 4:</b> topic #10 and #11 (TBA)</p>
12	<p><b>12. Economic Concepts (III): Social Costs of Climate Change</b></p> <ul style="list-style-type: none"> <li>● Cost-Benefit Analysis (CBA) concept</li> <li>● Social discount rates</li> <li>● Economic assessment of the damages caused by global warming</li> </ul>
Nov 20, 2023	<ul style="list-style-type: none"> <li>● Climate risks</li> <li>● Climate change adaptation</li> <li>● Economics of technology &amp; adaptation</li> <li>● Climate risks</li> <li>● Climate change adaptation</li> </ul> <p><b>Reading:</b> FF Ch.6, Stern Ch. 5,6, 9, 12, 18-20, Nordhaus Ch.15-16, 18, OECD (2015)</p>
13-14	<p><b>13. Group project presentation</b></p>
Nov 27- Dec 4, 2023	
Dec 12, 2023	<p><b>Final exam: Tuesday, December 12, 2023; 13:30 – 16.30 hrs.</b></p>

**Evaluation**

Midterm Examination	35%
Final Examination	35%
Group project or reports	15%
Quizzes, Assignments, 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.

- **Suggested topic lists:**

Charging stations/Batteries for EV	Electric train system	Low carbon aviation	Internal carbon pricing
Concentrating solar power	Low carbon agriculture or fishery	Biotechnology for adaptation	Green Bonds and Climate Investment Funds
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	Coastal adaptation	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:** Oct 16, 2023

**Submission date of the outline:** Oct 24, 2023

**Presentation dates:** Nov 27 – Dec 4, 2023

**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 CO<sub>2</sub> 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](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**

BE International Program, Faculty of Economics, Thammasat University

Address: 2 Prachan Road, Pranakorn, Bangkok 10200 Thailand

Tel: +66 (0)2613 2437-8

Fax: +66 (0)2224 0150

Email: [be@econ.tu.ac.th](mailto:be@econ.tu.ac.th)

Website: [www.be.econ.tu.ac.th](http://www.be.econ.tu.ac.th)

BE-Moodle: <http://bemoodle.econ.tu.ac.th/>

## ACADEMIC CALENDAR & HOLIDAY SEMESTER 1/2023

Semester 1/2023 (August 15 – December 4, 2023)	
<b><i>the TU Office of the Registrar (TU REG) will process the registration (semester 1/2023) for all BE students who have completed the pre-registration via BE Portal.</i></b>	July 17 – 20, 2023
Tuition Fee Payment Period (Via TU Greats App)	July 21 – August 11, 2023
Create Plan from Quota via TU Greats App (*ID.66)	August 1 - 9, 2023
Registration via TU Greats App (*ID.66)	August 10, 2023
Classes Begin	August 15, 2023
Add-drop period	August 15 – 28, 2023 <i>(from 9.00 AM of August 15 to 10.30 PM of August 28)</i>
Tuition Fee Payment Period (Via TU Greats App)	August 15 – 29, 2023 <i>(9 AM - 10.30 PM)</i>
Mid-term Examination Period	October 1 – 7, 2023
<i>H.M. King Bhumibol Adulyadej The Great Memorial Day*</i>	<i>October 13, 2023</i>
<i>King Chulalongkorn's Day*</i>	<i>October 23, 2023</i>
Withdrawal period with "W" on record	September 4 – October 22, 2023 <i>(from 9.00 AM of September 4 to 10.30 PM of October 22)</i>
Special Withdrawal with "w" on record	October 24 – November 20, 2023
Last day of class for Semester 1/2023	December 4, 2023
Final exam period	December 12 – 23, 2023
<i>H.M. King Bhumibol Adulyadej The Great's Birthday*</i>	<i>December 5, 2023</i>
<i>Constitution Day*</i>	<i>December 10, 2023</i>
<i>Substitution for Constitution Day*</i>	<i>December 11, 2023</i>
Submitting Forms for Degree Conferral	August 15 – 28, 2023

Remark \* Holiday, No classes during this period  
Updated: July 24, 2023