BACHELOR OF ECONOMICS
THAMMASAT UNIVERSITY

Course Syllabus
EE 376 Economics of Climate Change
Semester 1/2022

Number of credits:	3 credits
Prerequisites:	EE 210 or EE 211 or EE 213 (Credits will not be awarded to students who are taking or have completed any 400-level courses in this subfield.)
Hours:	Wednesday and Friday, 14.00-15.30
Lecture Venue	Room 206, 2nd floor, Faculty of Economics
Instructor:	Assoc. Prof. Chayun Tantivasadakarn Email [chayunt@econ.tu.ac.th] Office: Room# 8 the 60th Anniversary Building Office hour: Wednesday and Friday 9:00 – 10:30
Moodle enrolment key:	**0358**

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 Aug 10-17, 2022	**1. Introduction to Climate Change Science** • The Earth's climate system • Greenhouse gas (GHGs), global energy balance, and the greenhouse effect • Important GHGs: CO_2 and carbon cycles, other GHGs • Dissenting opinions: the great hoax? **Reading:** H Ch. 1-4, T Ch. 1, Nordhaus Ch.5, 13-14, 24-25, Incropera Ch. 2-6, 9.
Aug 12, 2022	Holiday: ***Queen Sirikit The Queen Mother's Birthday No class
3-4 Aug 19-24, 2022	**2. Anthropogenic global warming and consequences** • 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 **Reading:** H Ch. 6-7, Incropera Ch. 5, T Ch. 2, IPCC (2013a), Stern Ch. 3-6
5-6 Aug 26 - 31, 2022	**3. Climate Change and Market Failure** • Externalities and carbon pricing • Global commons and Tragedy of Commons • The under provisioning of Public Goods **Reading:** HR Ch. 3-4, T Ch. 3

7- 9
Sep 2-7, 2022
	4. Carbon Taxes
	• Optimum emission
	• Correction market failure with carbon
	  o Single source
	  o Multiple sources
	• Pros and cons of carbon taxes
	• Carbon tax research
	Reading: HR Ch. 16, T Ch. 4, Pearce, David (1991) pp. 938-948.

10 - 12	**5. Carbon Market or Cap-and-Trade** • Definition and concept of Carbon market

Date	Topics

Sep 9-14, 2022	• Demand and supply of carbon credits
	  ○ 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
	Reading: HR Ch. 16, T Ch. 5

13-14 Sep 16 - 21, 2022	**6. Technological Development Policy and mitigation** • 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 **Reading:** Grubb, M. (2004), Goulder and Schneider (1999), T Ch. 5
15 Sep 23, 2022	**7. Carbon Labeling** • 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
	Midterm: Wednesday, September 28, 2022; 12:00 – 14:00 PM
16 Oct 5, 2022	**8. Forestry and mitigation** • Forest situation in Thailand • Examples of forest bonds in other countries • Proposted forest bond system for Thailand
17 Oct 7, 2022	**9. Behavioral Economics and climate mitigation** • **Concept of nudge** • **Applications**
18	**7. Environment and Business** • Environmental trends

Date	Topics
Oct 12, 2022	• Sustainability: Megatrend • Business Adaptation
Oct 14	**Holiday: King Rama IX Memorial Day and bridge holiday** **No class**
19-20	**9. Global Institutions: Kyoto Protocol and Post-Kyoto** • 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 **Reading:** Incropera Ch. 8, T Ch. 5
Oct 19-21, 2022	

21-22	**10. International Trade and Climate Change**
	• Mitigation & competitiveness
	• Carbon offshoring and Carbon leakages
	• Concepts about GHGs responsibility
	  o Production-based and consumption-based responsibility
	• Carbon leakages and Border-Carbon Adjustment (BCAs) or Carbon-Border-Adjustment Measures (CBAM)
	  o Pros and cons of BCAs
	• World Trade Organization (WTO) and Climate Change
	Reading: Incropera Ch. 8, T Ch. 8-9

Oct 26 –28, 2022	
23-24	**11. Economic Concepts (III): Social Costs of Climate Change** • Cost-Benefit Analysis (CBA) concept • Social discount rates • Economic assessment of the damages caused by global warming • Climate risks • Climate change adaptation • Economics of technology & adaptation **Reading:** FF Ch.6, Stern Ch. 5,6, 9, 12, 18-20, Nordhaus Ch.15-16, 18
Nov 9-11, 2022	

Date	Topics
25 Nov 16, 2022	**12. Economics of Climate Change Adaptation** • Climate risks • Climate change adaptation • Economics of technology & adaptation • **Reading:** Stern Ch.5, 18-20, OECD (2015)
26-28 Nov 18-25, 2022	**14. Group project presentation**
	Final exam: Tuesday, December 13, 2022; 13:30 – 16.30 PM

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:

Charging stations for EV	Electric train system	Low carbon aviation	Internal carbon pricing
Concentrating solar power	Low carbon agriculture or fishery	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	Gender or Youth impacts

Small wind turbine energy	Green city	Waste water management	Poverty impacts
Energy storage technologies	Low carbon tourism	Coastal adaptation	IT/AI and 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 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 5, 2022
Submission date of the outline: October 19, 2022
Presentation dates: November 18 – 25, 2022

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_2 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. (ห้องสมุดปรีดี)

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 (2022) 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/

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ACADEMIC CALENDAR & HOLIDAY
SEMESTER 1/2022

Semester 1/2022 (August 8 – November 26, 2022)	
Registration at REG TU (*ID.62-64)	July 11 - 14, 2022
Registration at REG TU (*ID.65)	July 26, 2022
Tuition Fee Payment Period (Via TU Greats App)	July 15 - 17, 2022
Classes Begin	August 8, 2022
Add-drop period	August 8 – 21, 2022 *(from 9.00 AM of August 8 to 10.30 PM of August 21)*
*H.M. Queen Sirikit The Queen Mother's Birthday**	*August 12, 2022*
Tuition Fee Payment Period (Via TU Greats App)	August 22 – 24, 2022 *(9 AM - 10.30 PM)*
Mid-term Examination Period	September 25 – October 2, 2022
Withdrawal period with "W" on record	August 26 – October 16, 2022 *(from 9.00 AM of August 26 to 10.30 PM of October 16)*
*H.M. King Bhumibol Adulyadej The Great Memorial Day**	*October 13, 2022*
*King Chulalongkorn's Day**	*October 23, 2022*
*Substitution for King Chulalongkorn's Day**	*October 24, 2022*
Last day of class for Semester 2/2021	November 26, 2022
Final exam period	November 28 – 30, December 1 – 4, 6 – 9, 13 – 16, 2022
*H.M. King Bhumibol Adulyadej The Great's Birthday**	*December 5, 2022*
*Constitution Day**	*December 10, 2022*
*Substitution for Constitution Day**	*December 12, 2022*
Submitting Forms for Degree Conferral	August 8 – 21, 2022

Remark * Holiday, No classes during this period