

Course Form for PKU Summer School International 2023

Course Title	Title in English: Climate Change and Sustainable Development
	Title in Chinese: 气候变化与可持续发展
Teacher	Hancheng Dai
First day of classes	July 3, 2023
Last day of classes	July 28, 2023
Course Credit	2 credits
Course Description	
Objective:	
<p>It is increasingly recognized that climate change is intricately linked to sustainable development, not just in terms of joint underlying drivers, but also with respect to synergistic policy choices. Well-designed climate change mitigation policy can lead to significant co-benefits for sustainable development in air pollution control, energy security enhancement and resource efficiency improvement. To effectively inform decision making on these issues, whether at the national or international level, science must take an integrated and holistic perspective. The course aims to give an overview on the latest scientific consensus on climate change, climate impacts, climate change adaptation and mitigation, and the nexus between climate change mitigation and sustainable development goals such as high-quality economic growth, energy security, food security, air pollution control and human health improvement. Furthermore, it will briefly introduce how the complicated nexus could be understood and uncovered from system analysis perspectives.</p>	
Pre-requisites /Target audience	
<p>English proficiency, basic economics.</p> <p>Undergraduate students and graduate students who are interested in climate science, energy and climate economics and policy</p>	
Proceeding of the Course	
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Assignments (essay or other forms)	
<ul style="list-style-type: none"> ➤ Homework (Short essays and multiple literature review reports) ➤ Final presentation (critical review of a subject) 	

Evaluation Details	
<ol style="list-style-type: none"> 1. Weekly homework (70%); 2. Final presentation (30%). 	
Text Books and Reading Materials	
<p>➤ Climate Economics: Economic Analysis of Climate, Climate Change and Climate Policy, Richard S.J. Tol, Edward Elgar Pub, Second Edition 2nd Edition, 2019</p> <p>Assigned readings</p>	
Academic Integrity (If necessary)	
<p>Students will follow the academic principles of honesty, fairness, respect, and accountability and make a pledge as follows:</p> <p>“I will not lie, cheat, or steal in my academic endeavors; I will conduct myself responsibly in all my endeavors; and I will act if the academic principles are compromised.”</p>	
CLASS SCHEDULE (Subject to adjustment)	
Session 1: <i>Climate change 1: observations</i>	Date:
<p>【Description of the Session】 (purpose, requirements, class and presentations scheduling, etc.)</p> <ol style="list-style-type: none"> 1. To introduce course objectives, the structure, and the participation from students. 2. To demonstrate the phenomenon of climate change based on observations from different earth systems. 	
<p>【Questions】</p> <ol style="list-style-type: none"> 1. What is the scientific evidence that could support the existence of climate change? 2. What influences the trend in global average temperature? 3. What are the greenhouse effects and its relationship to climate change? 	
<p>【Readings, Websites or Video Clips】</p> <p>To be provided (TBP)</p>	
<p>【Assignments for this session (if any)】</p> <p>Please search for evidence based on observations that supports climate change.</p>	
Session 2: <i>Climate change 2: impacts</i>	Date:
<p>【Description of the Session】 (purpose, requirements, class and presentations scheduling, etc.)</p> <ol style="list-style-type: none"> 1. To introduce the impacts of climate change on agriculture, precipitation, sea level etc. 	

【Questions】	
What are/will be the impacts of climate change on nature and human systems?	
【Readings, Websites or Video Clips】	
TBP	
【Assignments for this session (if any)】	
TBP	
Session 3: <i>Climate change 3: driving forces</i>	Date:
【Description of the Session】 (purpose, requirements, class and presentations scheduling, etc.)	
<ol style="list-style-type: none"> 1. To demonstrate the socio-economic driving forces of climate change in the historical periods after the industrial revolution. 2. To introduce possible future climate change trends under different development pathways. 	
【Questions】	
<ol style="list-style-type: none"> 1. What are the key driving forces of climate change related to human beings? 2. How future socio-economic development could affect climate change? 	
【Readings, Websites or Video Clips】	
TBP	
【Assignments for this session (if any)】	
TBP	
Session 4: <i>Energy and climate change</i>	Date:
【Description of the Session】 (purpose, requirements, class and presentations scheduling, etc.)	
To understand how energy supply and consumption affect greenhouse gas emissions globally.	
【Questions】	
<ol style="list-style-type: none"> 1. What is primary energy and secondary energy? 2. How energy supply and consumption contribute to climate change and what is the regional disparity worldwide? 	
【Readings, Websites or Video Clips】	
TBP	

【Assignments for this session (if any)】	
TBP	
Session 5: <i>Climate adaptation</i>	Date:
【Description of the Session】 (purpose, requirements, class and presentations scheduling, etc.)	
To introduce how human being could adjust to actual or expected climate and its effects.	
【Questions】	
<ol style="list-style-type: none"> 1. Why do we need to adapt to climate change? 2. How could we adapt to climate change effectively? 	
【Readings, Websites or Video Clips】	
TBP	
【Assignments for this session (if any)】	
TBP	
Session 6: <i>Carbon neutrality</i>	Date:
【Description of the Session】 (purpose, requirements, class and presentations scheduling, etc.)	
<ol style="list-style-type: none"> 1. To introduce the concept of carbon neutrality, carbon sink and carbon reduction 	
【Questions】	
<ol style="list-style-type: none"> 1. What are the major sources of greenhouse gas (GHG) emissions in the various parts of the world? 2. What are the emission spaces for the globe to achieve 1.5 and 2 degree targets? 	
【Readings, Websites or Video Clips】	
TBP	
【Assignments for this session (if any)】	
TBP	
Session 7: <i>Climate change mitigation</i>	Date:

<p>【Description of the Session】 (purpose, requirements, class and presentations scheduling, etc.)</p> <p>1. To describe various efforts to reduce or prevent the emission of greenhouse gases. To understand the challenge of long-term low-carbon transition.</p>	
<p>【Questions】</p> <p>1. What are the main countermeasures to bring down GHG emissions from technological, management and consumption behavioral perspectives?</p> <p>2. What are the costs of climate mitigation?</p>	
<p>【Readings, Websites or Video Clips】</p> <p>TBP</p>	
<p>【Assignments for this session (if any)】</p> <p>TBP</p>	
Session 8: <i>Sustainable development goals</i>	Date:
<p>【Description of the Session】 (purpose, requirements, class and presentations scheduling, etc.)</p> <p>1. To provide a knowledge framework for achieving sustainable development.</p> <p>2. To introduce a framework for and fundamental concepts of sustainable development goals.</p>	
<p>【Questions】</p> <p>1. What are the key concerns and elements of sustainable development?</p> <p>2. How are the goals inter-connected?</p>	
<p>【Readings, Websites or Video Clips】</p> <p>TBP</p>	
<p>【Assignments for this session (if any)】</p> <p>TBP</p>	
Session 9: Climate Actions and sustainable development	Date:
<p>【Description of the Session】 (purpose, requirements, class and presentations scheduling, etc.)</p> <p>1. To describe how climate change mitigation could lead to various co-benefits that are the key elements of SDGs.</p>	

【Questions】 1. How climate change mitigation could bring co-benefits for air pollution control, water management, energy security enhancement and resource efficiency improvement? 2. How could synergistic policy choices be formulated to maximize the synergy?	
【Readings, Websites or Video Clips】 TBP	
【Assignments for this session (if any)】 TBP	
Session 10: <i>Final exam (Presentation)</i>	Date:
【Description of the Session】 (purpose, requirements, class and presentations scheduling, etc.) To make a final presentation about how to address climate change taking a typical region as an example.	
【Questions】 Depending on which target region you choose, what is the most appropriate strategy to address climate change, and what are the potential synergies and tradeoffs on other development goals.	
【Readings, Websites or Video Clips】	
【Assignments for this session (if any)】	

A CV of 250-300 words and a high-resolution personal photo should also be provided



Dr. Dai is an Assistant Professor and Director of the Department of Environmental Management in the College of Environmental Sciences and Engineering at Peking University. He is also a joint appointment research fellow of the Institute for Global Health and Development at Peking University. Dr. Dai's research focuses on green & low-carbon transformation and human & planetary health at the local, national and global scales. By developing and applying the state-of-the-art integrated assessment model, key questions are explored on the mitigation costs of achieving ambitious climate targets and their co-benefits on improvements in air pollution, human health and resource efficiency. Dr. Dai ranked as the World's Top 2% most-cited scientists released by Stanford University from 2020 to 2022. Due to his academic excellence, Dr. Dai was awarded the Outstanding Young Scholars by the National Natural Science Foundation of China in 2022. His main publications, including 13 ESI 1% highly cited papers, are on energy economics and policy related journals such as *One Earth* (Cell Sister Journal). Dr. Dai is active in multiple international and domestic science programs by serving as the Lead Author of the Global Environment Outlook Sixth Edition (GEO-6) for Cities, Contributing Author of the IPCC 6th Assessment Report, Global Burden of Disease (GBD) Collaborator. He is also the Standing Committee Member of Branch of Ecological

and Environmental Systems Engineering, Systems Engineering Society of China, as well as Committee Member of Branch of Climate Change of Chinese Society for Sustainable Development. He has also provided professional consulting services frequently to various well-known Non-Governmental Organizations such as the Energy Foundation China (EFC), Environmental Defense Foundation (EDF) and Natural Resources Defense Council (NRDC).