Sungkyunkwan University (SKKU) International Summer Semester (ISS) 2022

Climate Change: Science, Technology and Policy

SHORT COURSE DESCRIPTION

The issue of climate change has been one of the greatest global challenges to the development of urban places since a few decades. In December 2015 a landmark agreement was reached in Paris wherein countries commit to efforts to limit the temperature increase to 1.5 degrees Celsius above pre-industrial levels, recognizing that this will significantly reduce the risks and impacts of climate change. Yet 2015 to 2021 will be the seven warmest years on record, a period also characterized by the many major climate disasters (wet, dry, hot, cold, windy).

This course addresses the global struggle to contain global warming, the science behind climate change, the various policy frameworks for climate change as well as key local policies and technologies to deal with climate change. The course focuses on the role cities and technology can play in achieving the important climate targets, i.e. adapting to climate change impacts and mitigating climate change.

Through lectures and class seminars students discuss the question of how to mitigate climate change, looking at what the different urban sectors, for example transport, housing and/or urban agriculture, can do to reduce emissions of greenhouse gases; in addition, students discuss the vulnerability of cities and its population to climate change and different ways cities can innovate to adapt through various development and planning strategies. The course deals with climate change issues in both developed as well as developing countries.

In two seminars, and based on a fieldwork in Seoul, groups of students will present their own specific urban climate change issue and discuss state-of-the-art technology for adaptation and/or mitigation.

Ultimately the course seeks to provide students – through lectures, discussion and debate – with an overview of the most relevant and pertinent issues in climate change.

READING MATERIALS

A syllabus with both theoretical and conceptual introductions into the topic as well as relevant case-applications in scientific literature will be provided digitally to all students.

COURSE REQUIREMENTS AND GRADING

Students should at least have a general interest in the topic of climate change, urbanization and development. Teaching methods comprise of a series of lectures, brainstorms, group work exercises and discussions. Assessment is done over one infographic related to the Paris Agreement, and two graded issue papers that are also presented by the students in two seminars.

Students are expected to actively engage in the lessons and tasks. Grading breakdown: 20% infographic, 30% marked issue paper urban mitigation, 30% marked issue paper urban adaptation, 20% presentations, contribution to brainstorms and in discussions.

SKKU regulations require students to attend at least 80% of all classes. Besides, attendance, tardiness and academic dishonesty will lead to failing the course. More specific information about grading percentages and credit procedures will be distributed prior to the first lecture.

COURSE SCHEDULE

– WEEK I –

Monday (27 June)

Lecture: Introduction to Climate change: Definitions, Concepts, Impacts

The lecture introduces the basic concepts, definitions and impacts of climate change, discusses the evidence of climate change and implications for urban areas.

Preparatory reading

- The World Bank Group (2010). Cities and Climate Change: an urgent agenda (44p.)
- UN Habitat (2011): Cities and climate change. Chapter 1: Urbanization and the Challenge of climate change. (16p.)
- IPCC Special Report (2018): Global Warming of 1.5°C (32p.)
- Allam et al. (2020). Cities and Climate Change: Climate Policy, Economic Resilience and Urban Sustainability. Palgrave Macmillan. (Chapter 1)

Assignment

Brainstorming exercise: collecting climate change impacts

Tuesday (28 June)

Lecture: Watch and Discuss the new Al Gore documentary "An Inconvenient Sequel: Truth to Power"

The follow up movie of the 2 Academy Awards winning documentary film "An Inconvenient Truth" by the former United States Vice President Al Gore shows that he continues his tireless fight traveling around the world training an army of climate champions and influencing international climate policy. After the movie the class will perform a critical movie review and reflect on their own experience of climate change.

Preparatory reading from "An Inconvenient Truth"

- Quiring, S.M. (2007). Science and Hollywood: a discussion of the scientific accuracy of An Inconvenient Truth. *GeoJournal*, 70, Pages 1-3.
- Steig, E.J. (2007). Another look at An Inconvenient Truth. *GeoJournal*, 70, Pages 5-9.

Assignment

Plenary session, reflecting on details of the movie

Wednesday (29 June)

Lecture: Climate Change Concepts, Policies, Frameworks

Adaptation and mitigation are the principal policies for addressing climate change. While adaptation reacts to various climate change impacts by means of spatial planning and urban design, is mitigation focusing on energy, transport, industry and housing sectors. The lecture introduces to various global to local climate change policies, in particular the outcomes of the 2015 Paris Climate Deal and recent political events (Brexit, American elections), and discusses tradeoffs, synergies or conflicts between adaptation and mitigation.

Preparatory reading

- Yong-Xiang Zhang, Qiu-Hong Zheng, Lei Huang (2017). The withdrawal of the U.S. from the Paris Agreement and its impact on global climate change governance. *Advances in Climate Change Research*. Volume 8(4), December 2017, pp 213-219.
- Wilson and Piper (2010). Spatial Planning and climate change. Chapter 2 (up to 2.3): *Climate change mitigation and adaptation: impacts and opportunities.* (10p.)

- UNFCCC (2007): *Uniting on Climate: A guide to the Climate Change Convention and the Kyoto Protocol*. United Nations Framework Convention on Climate Change.
- Allam et al. (2020). *Cities and Climate Change: Climate Policy, Economic Resilience and Urban Sustainability*. Palgrave Macmillan. (Chapter 2)

Assignment
Group assignments: Collection of mitigation/adaptation measures
Homework assignment: Analyzing / synthesizing Paris Climate Agreement (2015) and 2022 state of play.

Thursday (30 June)
Lecture: Climate Change Mitigation
The reduction of CO2 emissions constitutes one of the largest challenges of the current era. This lecture discusses the different urban sectors and how they contribute to climate change, and the key technologies that can mitigate their contributions to the problem.

Preparatory reading
- Wynn Chi-Nguyen Cam (2012): Technologies for Climate Change Mitigation, GEF/UNEP.
- Allam et al. (2020). *Cities and Climate Change: Climate Policy, Economic Resilience and Urban Sustainability*. Palgrave Macmillan. (Chapter 2)

Assignment
Group assignment: Collection of mitigation/adaptation measures

– WEEK II –

Monday (4 July)
Lecture: Transport and Climate Change: An introduction
The reduction of CO2 emissions constitutes one of the largest challenges of the current era. Sustainable transportation can contribute to the mitigation of CO2 emissions. This lecture introduces the role of transport and infrastructure in solving the issue of climate change rather than being the problem.

Preparatory reading
- Banister (2011). Cities, Mobility and Climate Change. *Journal of Transport Geography*, 19(6), Pages 1538-1546.
- Kwang Sik Kim, John Dickey (2006). Role of urban governance in the process of bus system reform in Seoul, *Habitat International*, 30(4), December 2006, Pages 1035-1046
- Cervero and Chang Deok Kang (2011). Bus rapid transit impacts on land uses and land values in Seoul, Korea. *Transport Policy*, 18, 2011, 102-116
- Hickman and Banister (2015). Transport, Climate Change and the City. Routledge. (Chapters 1 – 3)

Assignment
Group assignment: listing key issues of transport induced emissions in the cities they come from (Problem Tree Analysis)

Tuesday (5 July)
Lecture: A Framework for Mitigation Transport Emissions
The Avoid-Shift-Improve (ASI) framework that is adopted by many of the international development banks for addressing transport and climate change is discussed in this lecture. Planning and policy

interventions based on ASI are discussed. Fundamentals of transport systems analysis are given to give the students basic understanding of the mechanisms of urban transport systems and the possible effect of interventions therein.

Preparatory reading

- Leather, J. & CAI-Asia. (2009). Rethinking Transport and Climate Change. *Report*, Asian Development Bank. Manila, Philippines.
- Grazi and Van den Bergh (2008). Spatial organization, transport, and climate change: Comparing instruments of spatial planning and policy, *Ecological Economics*, 67(4), November 2008, Pages 630-639.
- Cuenot, Fulton and Staub (2012). The prospect for modal shifts in passenger transport worldwide and impacts on energy use and CO2, *Energy Policy*, 41, February 2012, Pages 98-106.
- Offer, Contestabile, Howey, Clague, Brandon (2011). Techno-economic and behavioural analysis of battery electric, hydrogen fuel cell and hybrid vehicles in a future sustainable road transport system in the UK, *Energy Policy*, 39(4), April 2011, Pages 1939-1950.
- Hickman and Banister (2015). Transport, Climate Change and the City. Routledge. (Chapter 4)

Assignment
FCM group activity: Avoid – Shift – Improve (ASI) measures for Seoul, Korea

Wednesday (6 July)
Cities and renewable energy
This lecture discusses the urban energy landscape, from buildings to transport, to industry and power generation, and how renewable energy can bring tremendous benefits to cities, including cleaner air, modern services and improved living spaces.

- De Luca, Fabozzi, Massarotti, Vanoli (2018). A renewable energy system for a nearly zero greenhouse city: Case study of a small city in southern Italy. *Energy*, 143, 347-362

Assignment
Group assignment: data needs assessment for sustainable transport assessment for Seoul

Thursday (7 July)
Seoul Field work – Mitigation exercise.
In small groups students conduct a small research project and fieldwork on climate change mitigation in the city of Seoul.

– WEEK III –

Monday (11 July)
Mitigation seminar - Students present the results of their climate change mitigation site visits.

Tuesday (12 July)
Mitigation seminar – part 2 – Students present the results of their climate change mitigation site visits.

Assignment
Story telling in urban mitigation

Wednesday (13 July)

Lecture: Climate change adaptation planning

This lecture discusses measures on the local level suitable to adapt to climate change impacts. By learning from best practice examples different adaptation measures will be reviewed, and their synergies and tradeoffs with mitigation measures will be critically analyzed.

Preparatory reading

- EEA (2012). *Urban adaptation to climate change in Europe*. Challenges and opportunities for cities together with supportive national and European policies, European Environment Agency.

Assignment

Defining adaptation measures. Review of best practice cases.

Thursday (14 July)

Field work – Adaptation exercise

In small groups students conduct a small research project, including a fieldwork or desk research, on climate change adaptation in an Asian city or developing city. An annotated powerpoint will be prepared and presented.

Friday (15 July)

Lecture: Climate change adaptation: cities and the urban poor

This lecture discusses how climate change is impacting large parts of the developing world and discusses the problems and issues associated with adaptation in the context of cities in developing countries.

Preparatory reading

- The World Bank (2012). *Climate change, disaster risk, and the urban poor*. Urban Development Series, No. 68358.

Assignment

Video analysis: Climate change financing

– WEEK IV–

Monday (18 July)

Adaptation seminar - Students present the results of their climate change adaptation site visits

Tuesday (19 July)

Adaptation seminar – part 2 – Students present the results of their climate change adaptation site visits

Assignment

Story telling in urban adaptation

Closing: reflecting on the course and how the course has contributed to the ISS 2022 theme.