

Course Syllabus

Class/Department : Graduate Institute of Urban Planning

Course Title: Seminar on Urbanization and Global Climate Change 都市化與全球氣候變遷專題

Grade(應修系級) : Master degree students

Type: Required Selective Whole Half

Credits:2

Course Number:

Prerequisite Course: N/A

Professor: 葉佳宗(Yeh, Chia-Tsung), 黃書禮(Huang, Shu-Li)

Course Description:

Global climate change is becoming one of the most critical challenges to human society in the new millennium. The effects of climate change threaten to have unprecedented negative impacts upon human life and development. Urban areas, with their high concentration of population, industry and infrastructure, are the major sources of greenhouse gas (GHG) emission. They are also likely to face the most severe impacts of climate change. Urbanization and climate change have been co-evolving in such a way that urban population is to be placed at much higher risk from climate change. The extreme impacts of climate change on urban areas could have great impacts on environmental, economic, and social stability. This class will provide an in-depth assessment of the relationships between urban areas and climate change, and the central ways in which urban areas, cities, and other human settlements can mitigate climate change. The course explores three major themes: 1) the ways in which urban areas contribute to greenhouse gas emissions and climate change; and 2) the ways in which urban areas can mitigate greenhouse gas emissions and climate change; 3) the ways in which urban areas can adapt to the impact of climate change.

Course Outline: (including teaching schedule):

1. Introduction to the course (week 1)
2. Global urbanization (week 2)
 - Global urbanization and trend
 - Driving forces of urbanization
 - Impacts of urbanization
3. Global environmental change (week 3)
 - Global environmental change
 - Human activities and global environmental change
 - Urbanization and global environmental change
4. Global climate change (week 4-5)
 - Human development and greenhouse gas emission
 - Observations of global climate change

- Climate change in Asia and Taiwan
5. Urban contributions to climate change (week 6)
 - Urban structure and energy use
 - Land use change (Land cover change)
 - Urban greenhouse gas emission
 6. Impacts of climate change on urban areas (week 7-8)
 - Disasters
 - Ecosystem services
 - Urban land use
 - Health
 - Impacts on other fields
 7. Urban mitigations (week 9-10)
 - Framework and efforts of International mitigation
 - Urban mitigation strategies and efforts
 - Urban form, energy use and urban mitigation
 8. Urban vulnerability (week 11-12)
 - Exposure
 - Climate risk
 - Urban adaptive capacities
 - Vulnerability assessment
 9. Urban adaptation (week 13-14)
 - Concept framework of urban adaptation to climate change
 - Multi-level climate adaptation
 - Adaptive urban governance
 10. Urban human dimensions of climate change (week 15)
 - Society and Economics
 - Political and legal aspects
 - Policies and incentives
 - Community and participation
 11. Climate change and urban land use (week 16-17)
 - Urban planning and design
 - Co-benefits and trade off
 12. Student report session (week 18)

學生核心能力權重：八項加總為 100，不需每項均得填寫，惟至少需填一項

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|------|---|--------------------------------------|---|--------------------------|
| Item | Creative thinking and Problem-solving 創意思考與問題解決 | Comprehensive integration 綜合統整 | Communication and Coordination 溝通協調 | Team cooperation 團隊合作 |
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|--------|-------------------------------|--------------------------------|----------------------|----------------------------------|
| Weight | 40% | 30% | 10% | 10% |
| Item | Integrity and Upright 誠信正直 | Respect and Reflection 尊重自省 | Diverse care 多元關懷 | Cross-border cooperation 跨界合作 |
| Weight | | | | 10% |

Career Development:

This course will provide the training of urban planning and governance in response to climate change. This will be useful for the students' career of policy planning, academic research, and education.

Evaluation Methods:

Coursework will be weighted as follows:

Homework (reading and summary) 40%

Discussion 20%

Final report 20%

Attendance 20%

Others:

Readings & Assignments

Each week, students attending in this class will read a range of articles that will form the foundation of their knowledge of the issues. Every student is required to complete all the readings prior to coming to class, write a Synthesis & Assessment of all the readings for that week.

Reference texts:

Bulkeley, H. (2013). *Cities and Climate Change*. Routledge, London.

Selected paper from International Journals:

Antrop, M. (2004). Landscape change and the urbanization process in Europe. *Landscape and Urban Planning*, 67, 9–26.

Foley, J. a, Defries, R., Asner, G. P., Barford, C., Bonan, G., Carpenter, S. R., ... Snyder, P. K. (2005). Global consequences of land use. *Global Consequences of Land Use*, 309(5734), 570–574.

Grimm, N. B., Faeth, S. H., Golubiewski, N. E., Redman, C. L., Wu, J., Bai, X., & Briggs, J. M. (2008). Global change and the ecology of cities. *Science*, 319(5864), 756–760.

Grimmond, S. (2007). Urbanization and global environmental change: local effects of urban warming. *The Geographical Journal*, 173(1), 83–88.

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- Crowley, T. (2000). Causes of climate change over the past 1000 years. *Science*, 289(5477), 270–277.
- Karl, T., Knight, R., & Plummer, N. (1995). Trends in high-frequency climate variability in the twentieth century. *Nature*, 377, 217 – 220.
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- Clark, T. a. (2013). Metropolitan density, energy efficiency and carbon emissions: Multi-attribute tradeoffs and their policy implications. *Energy Policy*, 53, 413–428.
- Dhakal, S. (2009). Urban energy use and carbon emissions from cities in China and policy implications. *Energy Policy*, 37(11), 4208–4219.
- Ewing, R., & Rong, F. (2008). The Impact of Urban Form on U.S. Residential Energy Use. *Housing Policy Debate*, 19(1), 1–30.
- Kousky, C., & Schneider, S. (2003). Global climate policy: will cities lead the way? *Climate Policy*, 3(4), 359–372.
- Madlener, R., & Sunak, Y. (2011). Impacts of urbanization on urban structures and energy demand: What can we learn for urban energy planning and urbanization management? *Sustainable Cities and Society*, 1(1), 45–53.
- Meinshausen, M., Meinshausen, N., Hare, W., Raper, S. C. B., Frieler, K., Knutti, R., ... Allen, M. R. (2009). Greenhouse-gas emission targets for limiting global warming to 2 degrees C. *Nature*, 458(7242), 1158–62.
- Satterthwaite, D. (2008). Cities' contribution to global warming: notes on the allocation of greenhouse gas emissions. *Environment and Urbanization*, 20, 539–549.
- Grimm, N. B., Faeth, S. H., Golubiewski, N. E., Redman, C. L., Wu, J., Bai, X., & Briggs, J. M. (2008). Global change and the ecology of cities. *Science*, 319(5864), 756–760.
- Hallegatte, S., & Corfee-Morlot, J. (2011). Understanding climate change impacts, vulnerability and adaptation at city scale: an introduction. *Climatic Change*, 104, 1–12.
- Hunt, A., & Watkiss, P. (2011). Climate change impacts and adaptation in cities: a review of the literature. *Climatic Change*, 104, 13–49.
- Kalnay, E., & Cai, M. (2003). Impact of urbanization and land-use change on climate. *Nature*, 423(6939), 528–31.

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- Dhakal, S. (2010). GHG emissions from urbanization and opportunities for urban carbon mitigation. *Current Opinion in Environmental Sustainability*, 2, 277–283.
- Ruijven, B. van, & Vuuren, D. van. (2012). Implications of greenhouse gas emission mitigation scenarios for the main Asian regions. *Energy Economics*, 34, 459–469.
- Vuuren, D. van, Elzen, M. Den, & Lucas, P. (2007). Stabilizing greenhouse gas concentrations at low levels: an assessment of reduction strategies and costs. *Climatic Change*, 81, 119–159.
- Wright, L., & Fulton, L. (2005). Climate change mitigation and transport in developing nations. *Transport Reviews*, 25(6), 691–717.
- Adger, W. (2006). Vulnerability. *Global environmental change*, 16, 268–281.
- Brooks, N., Adger, W. N., & Kelly, P. M. (2005). The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation. *Global environmental change*, 15, 151–163.
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- Kaźmierczak, A., & Cavan, G. (2011). Surface water flooding risk to urban communities: analysis of vulnerability, hazard and exposure. *Landscape and Urban Planning*, 103, 185–197.
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- Renaud, F., & Perez, R. (2010). Climate change vulnerability and adaptation assessments. *Sustainability Science*, 5, 155–157.
- Biesbroek, G., Swart, R., & Carter, T. (2010). Europe adapts to climate change: comparing national adaptation strategies. *Global Environmental Change*, 20, 440–450.
- Bulkeley, H., Schroeder, H., & Janda, K. (2009). *Cities and Climate Change: The role of institutions, governance and urban planning.* (pp. 1–92).

- Füssel, H. (2007). Adaptation planning for climate change: concepts, assessment approaches, and key lessons. *Sustainability science*, 2, 265–275.
- Hamin, E. M., & Gurrán, N. (2009). Urban form and climate change: Balancing adaptation and mitigation in the U.S. and Australia. *Habitat International*, 33(3), 238–245.
- Kirshen, P., Ruth, M., & Anderson, W. (2008). Interdependencies of urban climate change impacts and adaptation strategies: a case study of Metropolitan Boston USA. *Climatic Change*, 86, 105–122.
- Measham, T., Preston, B., & Smith, T. (2011). Adapting to climate change through local municipal planning: barriers and challenges. ... for *Global Change*, 16, 889–909.
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- Moser, S. C., & Ekstrom, J. a. (2010). A framework to diagnose barriers to climate change adaptation. *Proceedings of the National Academy of Sciences of the United States of America*, 107(51), 22026–31.
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- Bulkeley, Harriet. (2006). A Changing Climate for Spatial Planning. *Planning Theory and Practice*, 7(2), 203–214.
- Jabareen, Y. (2006). Sustainable urban forms their typologies, models, and concepts. *Journal of Planning Education and Research*, 26, 38–52.
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- Pahl-Wostl, C. (2009). A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*, 19, 354–365.
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