ESM 410/510 : Climate Change Impacts, Adaptations and Responses: Geosphere and Anthrosphere

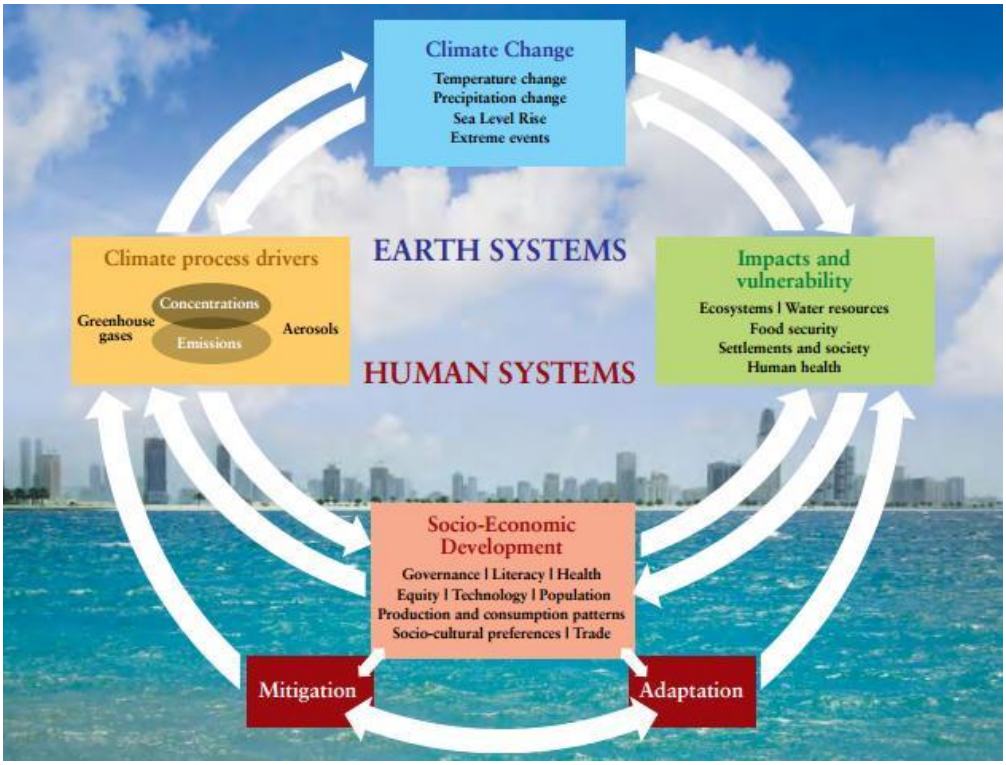

image: http://www.ipcc.ch/activities/activities.shtml

Instructor: Professor Linda George, georgeL@pdx.edu, Office Hours by arrangement
MW: 12:15 - 14:05 SH 244

Through lectures from local experts and researchers, reading of primary literature and discussion, students will acquire a strong understanding of the following topics:

- the scientific basis for human-influenced global climate change
- the impacts, interactions and feedbacks of global climate change with the geosphere and anthrosphere
    - weather, regional and local climate
    - water availability and quality
    - urban heat, air pollution and airborne diseases
- urban and natural systems climate change management adaptation and solutions to address existing and future impacts

Textbook: David Archer and Stefan Rahmstorf**, The Climate Crisis**, Cambridge University Press, 2010

Useful Resources:
The Intergovernmental Panel on Climate Change Fourth Assessment Report (www.ipcc.ch). The report is in four volumes: I - Physical Science, **2 - Vulnerability and Impacts**, 3- Mitigation, 4 - Synthesis Report

Tentative Schedule :

Week 1 : Understanding Climate Change and Adaptation

March 31: Science of Climate Change
View Film online : Climate of Doubt

April 2: Dr. Max Pincus-Nielsen
Discussion Climate Change Adaptation Plans
Readings:

- Bassett, Ellen and Shandas, Vivek(2010) 'Innovation and Climate Action Planning', Journal of the American Planning Association, 76: 4, 435 — 450
- Maggie Baynham & Mark Stevens (2014) Are we planning effectively for climate change? An evaluation of official community plans in British Columbia, Journal of Environmental Planning and Management, 57:4, 557-587
- Summary of Key Findings and Recommendation in the Oregon Climate Change Adaptation Framework (p.v-xvii)

Week 2: Climate Change and the Anthrosphere

April 7: Cities and Climate Change
April 9: Presentation: City of Portland - Michele Crim
www.portlandonline.com/bps/ccps

Week 3 -5 : Changes in atmospheric phenomenon

April 14: Extreme Weather (Professor Andrew Rice)

- H.E. Brooks, Severe thunderstorms and climate change, Atmospheric Research, 112 (2012) doi:10.1016/j.atmosres.2012.04.002
- Zwiers, Francis W., et al. "Climate extremes: Challenges in estimating and understanding recent changes in the frequency and intensity of extreme climate and weather events." *Climate Science for Serving Society*. Springer Netherlands, 2013. 339-389.
- Feddema, Johannes J., Joy Nystrom Mast, and Melissa Savage. "Modeling high-severity fire, drought and climate change impacts on ponderosa pine regeneration." *Ecological Modelling* 253 (2013): 56-69.

April 16: Discussion of research papers
April 21: Precipitation, water availability and quality (Professor Heejun Chang)

- **Chang, H**. and Lawler, K.* (2011) Impacts of climate variability and change on water temperature in an urbanizing Oregon basin. In *Water Quality: Current Trends and Expected Climate Change Impacts*, IAHS Publication 348: 123-128

- Praskievicz, S.* and **Chang, H**. (2011) Impacts of climate change and urban development on water resourdes in the Tualatin River basin, Oregon. *Annals of the Association of American Geographers* 101(2) 249-271.

- **Chang, H**., and Franczyk, J.* (2008). Climate change, land use change and floods: Toward an integrated assessment. *Geography Compass* 2(5): 1549-1579: *doi: 10.1111/j.1749-8198.2008.00136.x* (featured article in Hydrology and Water Resources).

April 23: Discussion of research papers

April 28: Heat and heat waves (Professor Dave Sailor)

- Masters, Jeff, and Weather Underground. "Heat Waves and Climate Change." (2012).
- Wolf, Johanna, et al. "Social capital, individual responses to heat waves and climate change adaptation: An empirical study of two UK cities." *Global Environmental Change* 20.1 (2010): 44-52.

April 30: Discussion of research papers

May 5: Climate Change, Regional Temperature and Disease Vectors (Professor Aslam Khalil)

May7: : Discussion of research papers

- McMichael, Anthony J., Rosalie E. Woodruff, and Simon Hales. "Climate change and human health: present and future risks." *The Lancet* 367.9513 (2006): 859-869.
- Jones, P. D., et al. "Observations: surface and atmospheric climate change." *In Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (2007): 235-336.

Week 6-8 : Changes effecting geo/ecosystems

May 12: Lecture Polar and mountainous regions (Professor Andrew Fountain)
Film: Chasing Ice

- Scherler, Dirk, Bodo Bookhagen, and Manfred R. Strecker. "Spatially variable response of Himalayan glaciers to climate change affected by debris cover." *Nature Geoscience* 4.3 (2011): 156-159.
- Dyurgerov, Mark B., and Mark F. Meier. "Twentieth century climate change: Evidence from small glaciers." *Proceedings of the National Academy of Sciences* 97.4 (2000): 1406-1411.

May 14: Lecture Sea Level Rise - Coastal Regions () Film: The Island President

- Hoegh-Guldberg, Ove, et al. "Coral reefs under rapid climate change and ocean acidification." *science* 318.5857 (2007): 1737-1742.
- Doney, Scott C., et al. "Ocean acidification: the other CO2 problem." *Marine Science* 1 (2009).

Week 9: Management of Climate Change

May 19: Lecture: Professor Eve Gruntfest CSU
Science of Communicating Risks

- Montz, Burrell E., and Eve Gruntfest. "Flash flood mitigation: recommendations for research and applications." *Global Environmental Change Part B: Environmental Hazards* 4.1 (2002): 15-22.
- Morss, Rebecca E., et al. "Flood risk, uncertainty, and scientific information for decision making: Lessons from an interdisciplinary project." *Bulletin of the American Meteorological Society* 86.11 (2005).

May 21: Lecture (Pincus)
May 26: Memorial Day Holiday
May 28: Course review/overview

Week 10: Student Presentations

Assignments:

Critique of Climate Adaptation Plan:

At the beginning of the term, students will identify a climate adaption plan for a city, agency, state or country that will be the focus of their analysis for the term. Students will analyze the existing plans based on the information and understanding gained during the term from papers and experts. The goal of the critique is to identify how well the plans take into consideration the projected climate impacts to the geosphere and anthrosphere, and to suggest ways that mitigation and/or adaption can be considered. At the end of the term, students will prepare a 10 minute summary of the adaptation plan and their critique.

Executive Summary and Discussion Questions:
For each guest lecture, students will read the assigned articles (TBD), write a one-page executive summary that relates the articles to their climate adaption plan and develops at least two key questions for discussion.

Grading:

- Attendance and Participation: 20%
- Executive Summary and Discussion Questions: 20%
- Critique of Climate Adaptation Plan (~2000 word) undergrad
  or
  Critique of Climate Adaptation Plan (~4000 word) including literature review of potential climate change impacts - grad: 20%
- Oral Presentation of Critiques: 20%
- Take Home Final Exam: 20%