

**NORTHEASTERN UNIVERSITY HONORS PROGRAM
DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING**

**HONR 3309B or CIVE 4778 – Climate Adaptation and Policy in an Emerging Economy
Summer 2 (July/August) - 2023**

Instructor: [Auroop R. Ganguly](#)

Teaching Assistant: [Puja Das](#)

Phone: 617-373-3710

E-Mail: a.ganguly@neu.edu

Office: 467 Snell Engineering

SDS Lab: 617-373-6005

Sustainability & Data Sciences Laboratory (SDS Lab)

www.northeastern.edu/sds/

Course description: This course will explore Nepal and India, specifically, Kathmandu, the national capital of Nepal in the lap of the mighty Himalayas, the national capital region of India, specifically, Delhi and Agra, the beautiful and incredibly diverse coastal state of the Kerala, and the sanctuary of Tibetan Buddhist culture in Leh and broadly Ladakh region of the Himalaya. A focus will be on how India, with her ever-growing urban regions, and with vulnerable coastal and inland populations, plan to adapt to climate change and natural hazards, and how they choose to participate in international climate and emissions negotiations. The implications for the nations of Nepal and India, and their outlook towards global policies, will be discussed. The discussions will be put in the context of the history and culture of the Indian subcontinent and South Asia. A primary objective will be to understand how an emerging, yet vulnerable economy adjusts to the reality of climate change and weather or hydrologic extremes, and how the need for frugal innovation and the will of citizens may drive decisions and policy even in a resource constrained nation. The course will emphasize how the natural and human engineered systems interact in the context of climate science and adaptation, the importance of data and computational sciences and the possible role of AI, as well as interpreting the roles of cultures in ancient yet continuous civilizations with recent history of colonialization, and in general on the role of history and culture. The students will be encouraged to think about possible lessons learned, if any, for emerging economies, as well as for the climate adaptation decisions and mitigation policy of developed economies such as the United States.

Our travel through the length and breadth of India will expose us to different cultures, languages, religions, climates, ecosystems, and economies. During our visit to the Taj Mahal and the forts of Delhi, we will learn about climate change, urbanization, and water challenges along the iconic river Yamuna and about the impacts of climate in the urbanized national capital. Our visit to picturesque Leh in Ladakh will take us into the Himalayas to one of the major remaining centers of Tibetan Buddhism in a democratic country. During our trip to Kathmandu, we will learn about the sustainability of mountains and glaciers, especially for small developing nations. In Kerala, we will learn about coastal cities and tropical ecosystems and habitats, as well as scenic mountains where spices have been cultivated since ancient times. Our visit during the monsoon season of Nepal and India will make us witness to a large-scale climate phenomenon that in a good year supports the economy of more than a billion people while in a bad year destroys lives and property.

A climate change war game described adaptation as “managing the unavoidable” and mitigation as “avoiding the unmanageable”. Irrigation planning and flood control in rural areas are important for food security and can save the lives of human beings at maximum risk. However, flash floods in regions like Kerala, caused by a combination of heavy monsoon rain and inadequate infrastructures, can cause havoc on the economy, and put lives at stake. Heat waves in Delhi and melting of glaciers in Nepal and the Ladakh region of India can upend existing economies, cultures, and ways of life. Reducing fossil-fuel emissions may limit global warming and hence climate change consequences but may be perceived as disruptions to growth. Balancing these constraints is a clear and present need for developing nations across the globe, and increasingly, for the developed world such as the United States. The students will learn about climate adaptation and policy based on discussions with the instructor, as well as possible interactions with guests from academia, private industry, and government

agencies. The students will also get an opportunity to get immersed in the culture of India and Nepal, and visit some of the cities, mountains, coastlines, as well as ecological and tourist attractions, to get acquainted with the long and continuous history and culture of the places we are visiting.

The course will culminate with a mock “war game” with focus on island nations and island communities, with a specific focus on global emissions and sea level rise. In addition to uncertainties, risk assessment and mitigation, the obligations of the largest emitting countries and the developed countries will be assessed. However, adaptation issues related to water resources, including saltwater intrusion and changes in precipitation patterns, temperature extremes especially heat waves, infrastructure for protection against inundation and storm surge, as well as population movement and climate refugees, will be discussed. resembling a situation where international negotiators meet to formulate treaties on climate change adaptation and mitigation. Each student will need to participate in the war game and demonstrate her/his understanding of the science and policy imperatives. Students will be working in groups to produce integrated presentation. Students will be divided into groups for the war-games. These groups will represent concerned parties, such as, India, SAARC nations other than India, United States, China, and the United Nations. Inter-regional discussions and negotiations will be enabled by the moderator group.

At the conclusion of this course students will be able to:

- Develop and demonstrate the ability to grasp a different culture and understand the extent to which lessons learned may be generalized.
- Clearly express their opinions in written and verbal work and support their opinion with relevant, well-researched and detailed evidence.
- Demonstrate their grasp of the climate change adaptation and policy challenges and imperatives for both the Mountains and Plains of India.

Assignments and Grading:

Assignments:

(1) Class Participation and Enthusiasm (Worth 15%): Students are expected to come to each and every excursion and guest lecture or discussion session prepared to listen, participate, and contribute. I would expect you to be immersed in the culture and understand the various sensitivities and the need to be respectful to guest lecturers, students, guides, and professors.

(2) Weekly Blog (Worth 25%): During the dialogue, students will maintain a photo journal or blog documenting their experiences abroad. You will write 2 entries per week (10 in total) on your site - 1 Blog due on Wednesday at 6pm, 1 Blogs due on Sunday at 12 noon.

Blogs must be submitted and site dated on or by the dates listed above or will not be accepted for grading. Each blog entry should be 100-200 words (about 1-2 paragraphs) and discuss the places we have visited or you have personally explored. You may also add pictures as well.

Your blogs can be fun but they must be formally written and academic in nature. They should be a mixture of all of the topics below: -Specific site visits, guest lectures, or interactions with students, academics and/or others on campus on in places visited.

-What you observe about life in the academic campuses, the cities and their streets, and non-urban or coastal regions. -The major challenges and priorities for Singapore and Indonesia in terms of climate adaptation and policy, and whether any lessons learned in a resource constrained economy may be generalized to a developed economy or vice versa.

(3) Reflection Papers / Reports (Worth 30%): During the dialogue, students will be asked to write 2 reflection papers each, approximately 6-8 pages, examining the guest lectures, discussions, history of the locations we've visited, and the learning that took place in each.

(4) Contribution in a climate change war game (Worth 30%): The students must go through the required reading and be prepared to participate in a climate change war game along those lines. The specific rules will be revealed during the game.

Note: Non-Honors students taking this course will get credit for CIVE 4778

Required Readings:

UNA-UK Climate 2020:

1. Climate 2020: Degrees of Devastation: <https://www.climate2020.org.uk/>
2. <https://www.climate2020.org.uk/we-cannot-ignore-climate-risk/>
3. <https://www.climate2020.org.uk/data-driven-solutions/>

Independent Advisory Committee Report on Applied Climate Assessment

1. IAC Report and SCAN website: <https://www.climateassessment.org/>
2. BAMS Summary: <https://www.ametsoc.org/index.cfm/ams/publications/bulletin-of-the-american-meteorological-society-bams/a-framework-for-sustained-national-climate-assessment-in-the-united-states/>
3. Full Report: <https://journals.ametsoc.org/doi/full/10.1175/WCAS-D-18-0134.1>

Governmental Reports on Climate Change in India

1. US Report: https://www.dni.gov/files/documents/climate2030_india.pdf
2. Indian Report: <http://www.indiaenvironmentportal.org.in/files/fin-rpt-incca.pdf>

Climate Change War Games, Center for a New American Security

1. CNAS website: <http://www.cnas.org/node/149>
2. CNAS Participant Briefing Book:
<http://www.cnas.org/files/documents/publications/Clout%20and%20Climate%20Change%20Briefing%20Book%20%5BFor%20Release%5D.pdf>
3. Nature News: <http://www.nature.com/news/2008/080805/full/454673a.html>

NOTE: The books for CIVE 4777 and the background Op-Eds are relevant for CIVE 4778

NUpath Attributes: This course (HONR 3309-B or CIVE 4778), together with the companion course (HONR 3309-A or CIVE 4777) for this Dialogue, may collectively satisfy three [NUpath attributes](#): **ND** (*Engaging with the Natural and Designed World*), **AD** (*Analyzing and Using Data*), and **IC** (*Interpreting Culture*).