

Course Description:

"A groundwork of environmental science, environmental awareness and ecological literacy for the incoming Ph.D. students is presented. The environment and its living and non-living components, and the interactions of these component areas studied. The course is set in a thermodynamic perspective and is based on a nested hierarchy of systems. Key concepts and principles that govern how we think the environment works are presented while learning how to apply these concepts to possible solutions of various environmental degradation, pollution and resource problems."

Please refer to the following papers in addition to the notes you have from class (i.e. the 3 page excerpts that I posted in Canvas Announcements entitled "Emergent Properties of Scale in Global Environmental Modeling exerpts.pdf"):

- a) *"A Review of Criticisms of Integrated Assessment Models and Proposed Approaches to Address These, through the Lens of BECCS"* (Gambhir et al. 2019)
- b) *"Are we on the right path to achieve the sustainable development goals?"* (Moyer and Hedden 2020).

Also:

- c) Familiarize yourself with the International Futures Program
<https://pardee.du.edu/international-futures-ifs-and-integrated-long-term-forecasting-global-transformations>

and the associated paper, *"International Futures (IFs) and integrated, long-term forecasting of global transformations"*.

Primer Task, prior to beginning this project:

- 1) Identify the Sustainable Development Goals (SDGs).

See instructions for this project below:

The final product will be equivalent to a test grade.

Important Benchmarks:

July 11th: First draft due of paper and presentation due.

July 24th: Final draft due (additional instructions will follow after you receive your first drafts back from me).

Instructions for this assignment:

Objective: To explore integrated assessment models in the context of Sustainable Development, contrasts between broader regions and more localized geographic spaces including, countries within regions and watershed basins within countries.

Task 1: Choose 1 of the 6 SDGs listed on Table 1 from *Moyer and Hedden 2020*. Post your selection in the Discussion Post entitled, “*Student SDG selections*” (first come first serve in terms of your selection; no two students can select the same SDG from Table 1. **Tip:** Choose early, as in ASAP!

Task 2: Characterize the following regions according to your chosen SDG: 1) *North America*, 2) *Latin American and Caribbean*, 3) *Middle East and North Africa OR Sub-Saharan Africa*, 4) *South Asia*, and 5) *Europe and the Russian Federation*. Your primary sources are *Moyer and Hedden 2020*, and the IF Program, however, you should use additional supporting references as necessary.

Task 3: According to your chosen SDG, characterize 3 countries within each of the 5 regions listed in Task 2, for a total of 15 countries. Your primary sources are *Moyer and Hedden 2020*, and the IF Program, however, you should use additional supporting references as necessary.

Task 4: Identify 1 river basin within each of the 5 regions listed in Task 2 for a total of 5 river basins. Characterize each basin according to the following parameters: a) *population*, b) *economy*, c) *biome and ecoregions*, d) *land-use*, e) *hydrology* (including a description of sub basins, sub watersheds, and anthropogenic alterations to the natural hydrology), and e) *biodiversity*. We will refine this characterization as we proceed in class. The river basin characterization should be within the context of all SDGs, with special emphasis on your chosen SDG from Task 1.

Task 5: Make recommendations as to what can be done to improve existing IAM projections (i.e. fill in gaps, or enhance current projects and outcomes) according to your chosen SDG from Task 1. Reference your findings at the regional, country and river basin scales, reflecting your findings from the above tasks. Gambhir et al. 2019 is a good point of reference.

Deliverables that you will turn in for this project:

- A) **A paper:** Incorporate your findings and characterizations from each of the tasks listed above. Include a certification that the document is plagiarism free.
- B) **PowerPoint Presentation** (enough slides for a 30 minute presentation which should be about 20-30 slides total).