Syllabus AOSS/NRE 480

Course: Climate Change: Move to Action

Instructor:
Prof. Richard Rood
e-mail: rbrood@umich.edu
phone: (734) 647-3530
office: Space Research Building (SRB), room 2525

Assistant Instructor:
Kevin Reed
e-mail: kareed@umich.edu
phone: (734) 936-5503
office: Space Research Building (SRB), room 2133

Meeting Time and Location:
Tuesday and Thursday from 9:30-11:00am
1024 Dana Building

Course Description:
This course explores the intersections of the science of climate change with society: policy, business, economics, public health, energy, ecosystems, environmental engineering, information science, journalism, religion, etc. The problem is approached from the perspective that there are communities with heterogeneous interests that are vested in both adapting to and mitigating climate change. The course will expose students to the fundamental factual and contextual elements surrounding climate change in order to facilitate effective participation in the response to realized and predicted climate change.

Course Structure:
2 Weekly Lectures with Discussion
Biweekly Discussion Sections (Time TBD)

Course Requirements:
1. ***Class preparation, attendance, and participation*.** The course is discussion-intensive course. Therefore attendance and participation are mandatory and vital to the success of the course. This includes coming to class prepared and having read the assigned readings for the lecture.
2. ***Reading Responses.*** To help in the fulfillment of (1.), during the course of the semester you are required to produce five reading responses of roughly one page (single-spaced). The responses do not need to be elaborate, but they should also not summarize the reading. They should be used by you as think pieces to refine your questions and insight from the readings. They must be **submitted via CTools** at least two hours before the start of lecture for the relevant readings.

3. ***Group Project.*** You will work in multi-disciplinary teams on projects to analyze current real-world problems and to develop strategies to address those problems. You are encouraged to create your own project group with other students early in the semester. Throughout the course will be progress reports during lectures to ensure that progress as a group is indeed being made. The project includes a written report **due on the last day of classes** as well as a group presentation. The times of the group presentations will be decided on in early March.

Lecture Schedule: (Approximate)

Lecture	***Title*** (required readings are in parentheses)
Jan. 5	Introduction: Course Outline; Simple Introduction to a Warming Planet; Class Discussion: Where are we all starting from?
Jan. 10	Basics: Glimpse into the climate change (global warming) problem, Observations and Projections; How is science-based knowledge generated? How do we organize our response to global warming? Relation of climate change to other global issues.
Jan. 12	Science-based investigation of the Earth's climate: The Earth-Sun-Space system; Atmospheric carbon dioxide and climate; Past variability and historical context; Carbon dioxide budget; The concept of balance.
Jan. 17	Science-based investigation of the Earth's climate: Carbon dioxide budget, Atmosphere, Ocean, and Land; The Conservation Principle; Energy Balance of the Earth as a Whole; The Earth System
Jan. 19	Science-based investigation of the Earth's climate: What do the observations of 2011 tell us? The role of particulate matter (aerosols) in the atmosphere.
Jan. 24	Science-based investigation of the Earth's climate: How does the Earth's climate respond to an increase of carbon dioxide? Feedbacks: If Earth warms a little bit, does the Earth respond by cooling a little bit or by enhancing the warming?
Jan. 26	Science-based investigation of the Earth's climate: Feedbacks, How has the Earth responded to changes in the past 250 years? Role of Ice, Ocean, and the Arctic, The possibility of abrupt climate change. Discussion of goals and forms of Class Projects; Are project ideas emerging?
Jan. 31	Science-based investigation of the Earth's climate: Natural variability of the Earth's climate; How do we observe the Earth's climate?

Feb. 2	Science-based investigation of the Earth's climate: Observations of the physical climate; Observations of ecosystems; The power of correlated information – Coherent and convergent evidence of climate change.
Feb. 7	Science-based investigation of the Earth's climate: Attribution of rising temperature to fossil fuel emissions. How do we distinguish a warming trend from natural variability? Summary of science-based knowledge of climate change.
Feb. 9	Peer Review, Assessment, and the Role of the Intergovernmental Panel on Climate Change. Revisit – How do we organize our response to global warming – Mitigation, Adaptation, Capacity, Resilience, Stabilization, Dangerous Climate Change, Geo-engineering.
Feb. 14	Project Proposals: Project Team Definition
Feb. 16	Overview of energy systems and emissions – 1. Existing energy sources and emissions.
Feb. 21	Overview of energy systems and emissions – 2. Emerging and future energy sources; strategies for reducing emissions.
Feb. 23	Policy Response: United Nations, Global and Federal Policy; What are the Challenges? Link of Population, Consumption, Economics, Energy and Climate Change.
Mar. 6	Policy Response: Uncertainty and its role in response to climate change; The role of wealth in its response to climate change; Emergence of ethics as a issue of climate change; Politicization of climate change in the U.S.
Mar. 8	Response: Emergence of local and regional approaches to climate change; The role of cities; Template for climate-change problem solving – or how does climate change inform what I am working on?
Mar. 13	Do economic, public health, agricultural, etc., considerations motivate societal-scale response to climate change? What is the role of policy, law, and regulation? What is the role of business?
Mar. 15	Summary of previous lectures and what they suggest for the future of the Earth. What are our options? Mitigation and emission reduction wedges. The necessity for adaptation.
Mar. 20	Project Status, Refinement of Scope, Identification of externalities
Mar. 22	Management of the climate and geo-engineering 1: Approaches

Mar. 27	Management of the climate and geo-engineering 2: Practicalities
Mar. 29	What are the opportunities for students and recent graduates? How do I communicate to others what I have learned in this course?
Apr. 3	Wild Card for Project Review, Paper Discussions, and Student Discussions
Apr. 5	Wild Card for Project Review, Paper Discussions, and Student Discussions
Apr. 10	Project Presentations
Apr. 13	Project Presentations
Apr. 17	Class Synthesis and Discussion

Here are the lectures that I am particularly interested in giving:

Global Geo-engineering: Strategies for Managing the Global Climate

- ➔ I have some ideas to talk about past experiments, the U.S. stance i.e. what are they doing about, patents there is an absurd amount of geo-engineering related patents now-a-days

Kyoto Protocol, Is the Sulfur Market a Good Policy Model for Climate Change

- ➔ Discussion on how it relates to the COPs today, i.e. Durban, Cancun, Copenhagen
- ➔ Timeline

Role of science and scientists in policy and decision-making, as it relates to Climate Change

- ➔ More of a Discussion than lecture
- ➔ Readings would be part of The honest broker by Pielke, Jr. and a short article by Jasanoff from American Scientist.

One final thought for a new-ish lecture would be on:

The evolution of science policy in the U.S.

- ➔ But science policy history in context to the U.S. system we have to day (i.e. Vannevar Bush *Science: The Endless Frontier)*
- ➔ How it relates to the international realm and science funding for climate change today. I'm thinking of the U.S. Climate Services?