CIV ENV 368: Sustainability: Issues and Action, Near and Far

Course Description

While there is general consensus on the definition of sustainability, there are many divergent views on what it means to scientists, social scientists and engineers, especially when considering what are appropriate activities in developed as compared to developing economies. The purpose of this course is to explore the issues that motivate the planning, policy, design and engineering of sustainable resource use and development. First we will consider the issues driving the need for sustainable design and development. Is it simply good practice (that few really apply . . .) or is there a more critical imperative? The principles of sustainability will be reviewed and then their application to energy, climate change, urban planning, transportation, water, ecosystem services, social equity and environmental justice will be considered. Case studies and examples from both developed and developing economies will be discussed and compared. Students will work on teams on short and long-term projects throughout the course. This course will serve students from a wide range of disciplines, who have a strong interest in environmental issues. Weekly readings will be assigned and periodic presentations will be made by students throughout the quarter.

Books:
- Selected Reading packet (Quartet Copying, 825 N. Clark Evanston, IL, 60201 Phone: 847 328-0720)

Evaluation:
- Participation – 20%
- Group Work – 20%; select a lecture topic and supplement/augment what I provide class.
- Short Position Papers on Readings/Talks (7) – 20% - (The week you give a lecture, no position paper required)
- Final Proposal/Project – presentation 20% (10% peer evaluation); report 20% (10% peer evaluation)

Class Schedule

1. **March 31** - Introduction
   Video – **Heat**, Martin Smith PBS Frontline Special
   (http://www.pbs.org/wgbh/pages/frontline/heat/view/)

2. **April 7** - The Case for Sustainability
   Readings:
   - Selected Chapters from **Collapse** (Prologue, Ch. 1, 2, 9, 10-13, 14-16).

Assignment – **Position paper 1** (Reflect on the video, Heat, and these readings – is there a compelling case for “sustainability” or is simply a fad and good marketing ploy? These position papers should be short and personal – what are your thoughts in response to the readings – 1-2 pages)
3. **April 14** - Principles of Sustainability

Readings:
- Selected Chapters from *The End of Poverty* (Ch. 1-4).

Assignment – Position paper 2

4. **April 21** - Energy (fossil fuels, biofuels, renewables, etc.)

Readings:
- Selected Chapters from *Natural Capitalism* (Ch. 1, 4).

Possible group presentation ideas – Biofuels – how to determine environmental effects, if any; Clean coal & carbon sequestration (IGCC & current facilities)

Assignment – Position paper 3

5. **April 28** – Climate Change

_Guest Speaker – Professor David Dana, Law School_

Readings:
- Thomas Homer Dixon, “The Great Transformation – Climate Change as Cultural Change,” Speech in Essen, Germany, June 8-10, 2009 (blackboard)

• Selected Chapter from *Natural Capitalism* (Ch. 12)

Possible group presentation ideas – Arguments against human induced climate change; IPCC AR4, [http://www.ipcc.ch/](http://www.ipcc.ch/) - Working Group I-III; Shifting positioning of climate change uncertainty vs. cost of mitigation efforts

Assignment – Position paper 4

6. May 5 - Buildings, Materials & Cities
Readings:
• “Borrowing from Nature,” *The Economist*, 09/06/07. (blackboard)
  1. Why are they greener than we are? (Nicolai Ouroussoff);
  2. The Accidental Environmentalist (Michael Kimmerlman);
  3. The Road to Curitiba (Arthur Lubow).
• Case study – “A Green Dream in Texas,” Texas Instrument green chip factory,“ 
  T. L. Friedman,NYT, 01/18/06. (blackboard)

• Selected Chapters from *Natural Capitalism* (Ch. 5, 6, 7, 9)

Possible group presentation ideas: Net zero energy buildings, nanotechnology, High performing buildings, high performing developments

Lecture – Thomas Homer Dixon, May 4 - *Capitalizing on Crisis: Innovation and the Climate-Energy Challenge* [5:15 p.m. - 6:15 p.m.  Owen L. Coon Forum, Donald P. Jacobs Center  2001 Sheridan Road, Evanston]

Assignment – Position paper 5

7. May 12 - Ecosystem services, Biodiversity, & Fisheries
Readings:
Possible group presentation ideas – Success of marine reserves, coral reefs, bluefin tuna, ecological restoration, wetlands, agriculture, etc.

Lecture – Timothy Smith, May 13 – Civil Ecology: A community systems framework for sustainability [5:15 p.m. - 6:15 p.m. Pancoe Auditorium]

Assignment – Position paper 6

8. May 19 - Transportation & Cities (automobiles, mass transit, urban planning)
Readings:

Possible group presentation ideas – Success of marine reserves, coral reefs, bluefin tuna, ecological restoration, wetlands, agriculture, etc.

Assignment – Position Paper 7

9. May 26 - Water – Quality, Quantity & Technology; Public Health
Readings:

Possible group presentation ideas – Success of marine reserves, coral reefs, bluefin tuna, ecological restoration, wetlands, agriculture, etc.
Possible group presentation ideas – Case studies about water limits, explore potential for water and conflict, water as next oil, water use in agriculture, particularly beef industry, water reuse/recycling in industry.

Assignment – Position Paper 8

10. June 2–
Readings: Social Equity/Social Justice/Social Policy
• T. Homer-Dixon (2000). *The Ingenuity Gap*, Ch. 1 (Careening into the Future) p. 11-42. (course packet)

- Selected Chapters from *The End of Poverty* (8, 9, 11 – 17)
- Selected Chapters from *Natural Capitalism* (Ch. 13-15)

Lecture – Rosina Bierbaum, June 1 – *Climate Change & Ecology* [5:15 p.m. - 6:15 p.m.  Kellogg]

Assignment – Position Paper 9

11. June 9 – Project Presentations

Group Projects

1. Divide into student teams for quarter (4-5 students per team, depending on enrollment).
2. Select 1 weekly topic, prepare class presentation providing greater depth (20-30 minutes)
3. Quarter Project – 3 objectives (Sustainability requires system view (many parameters), what is metric to show improvement over BAU, consider developed vs. developing country approach).
   - Choose topic (Ecosystem services, water, food, transportation, energy, cities) What is the sustainability challenge?
   - What change is required to make sustainable?
   - Analyze the impact, feasibility (technical & economic), & time horizon of proposed action to improve sustainability. Can you work within system (evolution) or do you recommend revolution.
   - Case study, research to provide evidence or scientific/engineering/theoretical underpinnings of proposal. How economically viable is the idea?
   - What will it take to make proposed actions happen (driver, voluntary, policy needs, regulations, etc.)
   - How will you measure effects (metric) so you can show action produces more sustainable outcome than present practice.
4. Oral presentation & Written report.
5. Peer and Instructor Evaluation