EAS 3110: Energy, the Environment, and Society
Spring 2015

MW 3-4:30pm, L1175 ES&T

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Course Overview
The quest for a sustainable energy future involves balancing a series of oftentimes competing goals. On the one hand, continued population growth, combined with increased energy consumption by citizens in ever-richer developing countries, require energy production to keep pace with growth in demand. Access to cheap energy has fueled global economic development, and there is widespread concern that any increases in energy prices will undermine economic growth. At the same time, the scientific consensus on climate change is now clear: carbon dioxide emissions from fossil fuel combustion are altering Earth's climate. The search for affordable, low-carbon, and renewable energies to fuel 21st century economies has become a local, national, and international priority. The energy landscape is currently in rapid flux, with the production of cheap, abundant natural gas providing unique challenges and opportunities, while renewables gain traction in a diversified energy landscape. Our choices over the next decade will determine the course of energy infrastructure development, and therefore carbon dioxide emissions, for much of the 21st century.

This interdisciplinary seminar-style course relies on guest speakers from across the Tech campus and beyond, encouraging lively discussion of both current events and past developments relevant to our nation's energy and climate future. The main student activity will be a semester-long "Carbon Reduction Challenge", in which student teams compete to reduce carbon footprints by the end of the semester.

Course objectives
The primary goals of the course are:

- to familiarize the students with the science of climate change, and its uncertainties
- to equip students with the scientific and technical knowledge required to understand America's current energy infrastructure and alternative energy strategies
- to engage students in an interdisciplinary dialogue about one of the most pressing and complex problems facing modern societies
- to inspire students to become active participants in shaping a sustainable energy future

Course Structure
The course will be divided into four parts:
Part I: Overview of current energy use trends and projections
Part II: Greenhouse emissions and anthropogenic climate change
Part III: Policy strategies for reducing greenhouse emissions
Part IV: Low-carbon energy technologies and America's energy future

Requirements
Class participation: As much of the course focuses on discussion, students are required to read all assigned materials before class. Instructors will prepare a list of discussion questions, which will be addressed to individual students during group discussions. Mid-term grades for class participation will be distributed so that students can improve their participation if necessary.

Written briefs: Students will be responsible for submitting 300-word (about 1 page double-spaced) briefs that summarize the material covered in class (see assigned dates on class schedule). Please see "Tips for Writing Clearly" on class web-site.

Team research projects and presentations: "*Carbon reduction challenge*"
Teams of 3-4 students will design and implement a strategy for reducing their combined CO_2 footprint. Each team must quantify the CO_2 reductions that are associated with their reduction activities through the investigation of primary literature. The teams will present the results of their efforts and research to the class in the form of oral presentations, and to the EAS and HP communities in the form of poster sessions. The team with the most effective CO_2 reduction strategy (total amount reduced and degree of plan's success) at the end of the semester will accompany the instructor to Capital Hill to meet with Georgia lawmakers.

Grades for final products of the Carbon Reduction Challenge (presentation, execution, and poster) will be allotted on a sliding scale, based on peer assessments of individual team member contributions, combined with the instructor's own assessment of relative contributions. Ex: If individual team members performed their fair share of the work or more, they will receive 100% of the credit for the team's final products. Team members who performed half their share of the work get half the credit for the team's final products. If the team receives a 90% overall grade on their poster presentation, then the first student would get a 90%. The second student in question would get a 45%. This can make or break your final grade at the very end of the class, so be sure that you do what you need to do to contribute fairly to the project.

Please note that late assignments will be penalized 5% per day late, without prior permission from the instructor.

Grading: total = 1000pts
200 Participation in discussions/keeping up with reading
200 Written briefs (5 briefs x 40 pts each)
150 Plan for CO_2 reduction (Rough Draft = 50 pts; Final Plan = 100 pts)
150 Execution and evidence of CO_2 reduction: did the plan succeed?
150 Oral Presentation
150 Final Poster Presentation

Note that all required readings will be distributed in class or available on the web.

Schedule of topics (subject to change pending speaker availability):

Jan 5	Introduction
PART I	**Current energy use and trends**
Jan 7	Overview of global and national energy usage and trends
Jan 12	Overview of the transportation sector
Jan 14	Electricity: A Southern Company perspective
PART II	**Anthropogenic global warming: causes and consequences**
Jan 21	The Greenhouse effect & Earth's radiative balance
Jan 26	IPCC Working Group 1: The Physical Science Basis
Jan 28	Regional climate impacts in the Southeastern US
Feb 2	Positive feedbacks on climate change: methane and ice
Feb 4	Freshwater resources in the 21st century
PART III	**Legislative strategies for reducing emissions**
Feb 9	*International*: The Kyoto Protocol
Feb 11	Beyond Kyoto: multi-lateral climate negotiations
Feb 16	*National*: the Clean Air Act and the EPA
Feb 18	Climate change/energy bills pending in Congress
Feb 23	*Mock floor debate*
Feb 25	*Regional*: Regional alliances for greenhouse reductions
PART IV	**Alternative energy sources in America's future: science, technology, and economics**
Mar 2	Interface FLOR fieldtrip
Mar 4	Renewable Portfolio Standards
Mar 9	Carbon sequestration technologies
Mar 11	Nuclear
Mar 23	Solar
Mar 25	Wind
Mar 30	Energy from landfills - plasma
Apr 1	The future of electricity in the Southeast; clean coal?
Apr 6	*Transportation*: biofuels
Apr 8	Hybrid/electric car technologies
Apr 13	Mass transit potentials
Apr 15	Invited Speaker
Apr 20	Student presentations (Groups 1 & 2)
Apr 22	Student presentations (Groups 3 & 4)
May 1	2:50pm – EAS poster session

The Georgia Tech Honor Code
http://www.honor.gatech.edu/honorcode/honorcode.html

The definition of plagiarism (from the GT Honor Code):
" 'Plagiarism' is the act of appropriating the literary composition of another, or parts of passages of his or her writings, or language or ideas of the same, and passing them off as the product of one's own mind. It involves the deliberate use of any outside source without proper acknowledgment. Plagiarism is scholarly misconduct whether it occurs in any work, published or unpublished, or in any application for funding."