The Global Environment: a trip from the Big Bang to Climate Change
(BISC 427 or GEOL 427 or ENST 427)

Class Time: T and TH 11:00 am - 12:20 pm; SGM 226

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Text: No text required. All readings will be posted on the class website (Brightspace).

We focus on the development of Earth as a habitable planet, from its origin to human impacts on global biogeochemical cycles in the ocean, land, and atmosphere. We seek to define the scientific basis for understanding the magnitude and temporal scales of recent global environmental changes. The class is divided into three sections; Section I describes the major processes (from the Big Bang to the Earth's formation) that provided the raw materials for the evolution of life on planet Earth. In this section, we will also study how the different biochemical pathways evolved and how some of them have influenced Earth's climate and chemical composition. Section II describes human impact on the planet. Section III concentrates on potential solutions to human-induced changes.

Class Approach: In this class, we will use a "follow the carbon approach". We are going to learn about how the world functions through the carbon atom because: Life is based on carbon, the availability of carbon to life is maintained by a natural flow among the biosphere, atmosphere, geosphere and hydrosphere, modern civilization is built on carbon (energy, plastics, chemicals, medicines, etc.), and carbon is the basis of some of the major environmental and political problems that we are facing.

Grading:
1) In-class quizzes, homework and class discussions (**40%).**
3) Student presentation. Presentations will be 15 minutes long and based on any topic covered in the class **(15%).**
4) Exams (**15 % each-30%).**
5) Final exam; cumulative (**15%).**

January

14 Class overview and discussion of the Fermi Paradox
16 Evolution of the Chemical Elements, Universe, Solar System and Earth part 1
21 Evolution of the Chemical Elements, Universe, Solar System and Earth part 2
23 Big Bang Machine (Higgs boson)
28 Uniqueness of our solar system
30 Carbon in the universe

February

4 Evolution of Earth's atmosphere, ocean and origin of life
6 Origin of life II
11 Concept of time exercise (Class Discussion)
13 Evolution of metabolic diversity and metallo-enzymes evolution
18 Ferredoxin: chemical properties of the elements of life (Class Discussion)
20 Rise of oxygen and impact on Earth's evolution
25 Key events in biological evolution (Summary)
27 **Exam 1**

March

4 Is climate change a hoax?
6 GHG and global warming
11 Intergenerational inequities in exposure to climate extremes and Actions for reducing US emissions at least 50% by 2030 (Class Discussion)
13 Six degrees could change the world
18 Spring Recess
20 Spring Recess
25 Anthropocene and Limits to Growth
27 Abrupt Climate Change and geo-engineering

April

1 How feasible is it to obtain energy independence in the United States? (Class Discussion + exercise)
3 Energy wedges (Class Discussion + exercise)

8 Environmental solutions to climate change: fixing the electrical grid, changing our diet and natural climate solutions.
10 **Exam 2**
15 Presentations
17 Presentations
22 Presentations
24 Presentations
29 Presentations

May

1 Final Discussion and "State of the Planet"
13 Final exam (11 am-1 pm)

Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standardshttps://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriatesanctions/.

Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct/.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity http://equity.usc.edu/ or to the Department of Public Safety http://capsnet.usc.edu/department/department-publicsafety/online-forms/contact-us. This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage sarc@usc.edu describes reporting options and other resources.

Support Systems

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.htmlprovides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information http://emergency.usc.edu/will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.