

FRINQ Sustainability: 1st Midterm Study Guide

Midterm: in-class Tuesday Feb. 1.

Suggestion: Review your notes and the course readings in order to write out your own understanding of each of these terms/phrases. Imagine a friend or relative unfamiliar with this class asks you what each of these terms or phrases means. Make sure you could give them a reasonable answer to each. Next, try to create your own questions around these topics. What might you be asked?

Health Care Reform

- Comparing US systems to other countries
 - British (gov. owned), Japanese (tight price control), German (multiple payers, but tightly controlled), Taiwanese (blend of others), Swiss (recent switch, similar anti-gov. culture)
- Common themes in other systems: profit not allowed on basic care, price controls, universal coverage, cost substantially less per person, often healthier citizenry (by many measures)

Climate Change:

- Keeling curve, carbon dioxide sources and sinks, greenhouse gases theory, albedo
- Models and Indicators of change
 - Sea ice changes (Shishmaref, AK)
 - Permafrost (Drunken Trees)
 - Glacier melt (Greenland)
 - Biological: Comma Butterfly, Golden Toad, *Wyeomyia smithii* Mosquito
 - Thermohaline circulation (possible disruption)
- “Time Machines”
 - Greenland Ice Cores (also Antarctic Ice Cores):
 - atmosphere: trapped air bubbles; temperature: isotopic composition of ice
 - Lakebed sediment pollen samples: shows kind of plants growing there historically
 - Ocean and lakebed sediments for wind blown substances (e.g. dolomite)
- Heat Forcing, Dangerous Anthropogenic Interference (DAI)
- Stabilization Triangle, Stabilization Wedges
- Difficulties of societal decisions, equity and fairness issues, exploitation of power, political resistance to change,

Systems and Data Analysis

- Habits of a Systems thinker (applied to food and climate systems)
- Basic Systems Ideas: Parts (elements) and Relations; Order vs. disorder; System and its Environment, “stuff-free” science
- Positive and Negative Feedbacks in Climate System
 - + albedo of sea ice vs. sea water, glacier acceleration, permafrost CO₂ and methane release
 - –more heat coming in yields more radiated out, water vapor and reflection by clouds (?)
- System states, equilibrium (and their stability)
- Non-linear dynamics, chaos (Butterfly Effect), Catastrophe Theory (Ozone Hole Example)
- Emergent properties of systems
- Local vs. Global optimization (tension between systems and subsystems)
- Statistical significance in Science (probability that results due to chance < 0.05)
- Causation vs. Correlation (hidden variables)
- Tragedy of the Commons (free-rider problem, race to the bottom, arms race)