

MAE 124 / ESYS 103 Midterm Study Guide

Objectives of the course:

1. Introduce interaction of human activity with the “environment” in broad sense.
2. Demonstrate importance of embedding environmental dimension into industry, planning, design, economics, and politics.
3. Explore methodologies and look at case studies for accounting for environmental impacts and costs of human activity, while enabling the objective of “sustainable development” (i.e. development that meets the need of the present without compromising the ability of future generations to meet their own needs.)
4. Evaluate the severity and urgency of environmental problems and potential solutions from a variety of perspectives using knowledge and critical thinking skills developed in class.
5. Use methodologies and perspectives developed in class to quantify trade-offs for both the status quo (i.e. “business as usual”) and proposed alternatives.
6. Make informed decisions in your design for the future that account for and document the trade-offs in an objective manner.

Weekly Topics and Goals

Week 1: Tragedy of the Commons

1. Societal Collapse examples, causes
2. Tragedy of the Commons (inevitable for communal resources? Bad behavior drives out good?)
3. Tragedy of the commons applied to air quality (3 types of air pollution CFC, GHG, traditional),
4. Greenhouse warming, warming of the oceans, and sea level rise
5. Predict the consequences for various sea level rise scenarios for the California and the world (i.e. beyond a simple increase in ocean volume).
6. Ecological footprints as a measure of individual resource use.

Week 2: Global Warming

1. UCSD’s efforts to develop sustainable practices.
2. Explain the greenhouse process, how humans are enhancing the greenhouse effect, and the important feedback processes
3. Based on projections of global average temperatures in the near future (i.e. your lifetime), explain the likelihood and severity of a broad range of impacts for natural systems, humans, and the environment.
4. Apply your understanding of the scientific method, scientific reasoning, and the IPCC process to gauge the credibility of current and projected consequences of global warming. Understand current status of climate negotiations following Copenhagen talks in 2009.
5. The carbon cycle and greenhouse warming.
6. Comprehensive understanding of environmental challenges facing our society from multiple, objective view points

Week 3: Peak Oil and Energy Resources

1. Understand links between energy usage and economy.
2. Evaluate oil, coal, and natural gas availability in coming decades and centuries.
3. Evaluate proposed plans – including “business as usual” – for meeting future energy needs of the US. Describe the challenges, proposed solutions, and the potential consequences of various solutions.
4. Nuclear power, and the characteristics of fourth generation nuclear power generation.

5. Describe the pros/cons of major non-renewable energy sources (and risks, both perceived and real).

Week 4: Water Issues for San Diego and the World

1. Apply knowledge of the natural hydrologic cycle, California's water history and population, and California's water delivery infrastructure to assess vulnerabilities in present and future water supplies
2. Speculate and characterize future challenges water access and availability issues (San Diego and the world) based on past water resource issues and future water projections.
3. Nuclear energy as a potential fresh water source
4. Ecosystems, fishing down the food chain, and preserving the environment.

Week 5: Population, Food, Agriculture

1. Population growth, Malthus' projections, current UN population projections.
2. Population as a taboo topic---why population policies are difficult to negotiate
3. History of the Green Revolution: why Malthus' predictions haven't yet come true
4. Beyond the Green Revolution: GM crops and future agricultural goals
5. Deforestation, top soil loss and changing land use
6. Assess impact of expanding agriculture on ecosystems, and impact of converting agricultural lands to urban development.