NS 115: Environmental Earth and Life Science

- **Instructor: Z. Wang**
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  - **Office Hours: TuTh: 11am -12 pm and 1-2 pm by appointments**
- **Lecture: TuTh 5:00-6:15**
- **Classroom: McL 229**

NS 115: Environmental Earth and Life Science

- **Textbook (required) McKinney, M. L. and Schoch, R. M. 2003*. Environmental Science: Systems and Solutions (3rd Edition)*, Jones and Bartlett Publishers.**
- **Textbook homepage: *http://environment.jbpub.com/mckinney/***

Goals and Structure

- **Lectures: Main points of the chapters.**
- **Discussion: student-driven analysis of environmental issues.**
- **Major issues: Population, Resources, Energy, Pollution and Economics**
- **Grading system:**
  - **Attendance/Quizzes** — **10% (1 miss = -1.25/total hours)**
  - **Homework/Case Study** — **15% (use the best 8 out of 10 writings)**
  - **Term paper (on approved topic)** — **15% (TEXT length > 4000 words)**
  - **Midterm exam 1*** — **10% (chapters 1-4)**
  - **Midterm exam 2*** — **15% (chapters 5, 6, 9-13)**
  - **Midterm exam 3*** — **15% (chapters 7,8, 14-17)**
  - **Final exam*** — **20% (emphasize on later chapters)**

Administration

- **Attendance Required and counted.**
- **Case Study: 10 one-page writings, use 8**
- **Term Paper (see instructions in Syllabus)**
  - **Investigate and write on practical environmental issues.**
  - **TEXT length > 4000 words**
  - **Table, Figures, References**
  - **Oral presentation: May 4 and 6**

Administration

- **Drop and add to this class**
- **About the Term Paper and Case Studies:**

- **Term Paper Proposal (1 page) email to me by 1/17/03, the day of Exam1**
- **Explain Your concerns and thoughts**
- **Email Subject / file name: NS115-Your LastName-FirstName-AssignmentName. e.g., NS115-Smith-John-CaseStudy1 NS115-Smith-John-TermPaper1**

Web Course in a Box

- **The NS115 website is on Blackboard: *http://blackboard.csufresno.edu***
- **I will post lecture notes there**
- **I will pose announcements there**
- **I will pose study materials there**
- **You need a CSUF email account to log on to Blackboard**

Discussion

- **Have you visited Blackboard?**
- **We will show videos/audios followed by quizzes. Video session necessary?**

- **Emergency Evacuation: site-North of North Gym. Call 911 from a campus phone or 278-2132 using a cell phone.**

- **Questions about the course materials?**

My Goals for this Course

- **Instill awareness of environmental problems and what is required to solve them**
- **Examine environmental issues from all perspectives: scientific, political, societal, and ethical**
- **Create a self-learning environment and encourage teamwork approaches to addressing environmental issues**
- **Assist each of you in finding a way to contribute to the betterment of this planet**

Introductory Lecture

- **Course overview**
- **What is Environmental Science?**

- **Population growth**
- **How have we impacted the environment?**
- **Setting priorities**
- **Requirements for a sustainable planet**

Definitions and Concepts

- **Environmental Science: study of how humankind affects other organisms and the physical environment**
- **Environmental Sustainability: ability of the planet to provide resources and sustain life without becoming damaged or depleted**
- **Ecology: study of interactions among organisms and between organisms and the physical environment**

Examples of Sustainability

- **Sustainable agriculture: Ability to feed the earth's population indefinitely without destroying the land or polluting the environment**
- **Sustainable energy: Energy that will not get used up**
- **Sustainable use of minerals: Supplying earth's needs for minerals without depleting supply**
- **Sustainable development: Developing land and accommodating population growth without harming natural ecosystems**

Why We Aren’t Living Sustainably

- **We are using up our nonrenewable resources**
- **We are overusing many renewable resources**
- **We are polluting the environment**
- **Our population and “living standard” continue to grow**

The Science of Environmental Science

- **Scientific principles will be helpful in understanding complex environmental problems**
- **Science will rarely provide absolute answers**
- **Proper management of the planet requires environmental wisdom**
- **Each of us must make a personal choice about where we stand**

Our Changing Environment

Between 1950 and 1995, the following changes have occurred on this planet:

- **The world population has increased from 2.5 billion to 5.6 billion**
- **20% of the topsoil has disappeared**
- **33 to 50% of all the forestland has been removed**
- **The composition of gases in the atmosphere has been altered**

- **Thousands of plant, animal, fungi, and micro-organism species disappear each year**

Between 1995 and 2025, at least 3 billion more people will impact the planet

Environmental Impact

- **Resources are being depleted faster than the earth can restore them**
- **Some pollution exceeds the earth's capacity to neutralize or absorb**
- **Society's impact is due to both population and technology**
- **Total Impact = (Impact/Person) X Number of People**
- **The only solution is to slow population growth and/or reduce the impact of technology**

Environmental Impact

- **Population will grow exponentially if not controlled**
- **Population reached 6 billion in June 1999**
- **Some estimates of the maximum sustainable population of the earth are as low as 6-8 billion**
- **Technology improvements increase the impact per person on the environment**

Unchecked Exponential Growth

Imagine that every woman has 2 daughters within 20 years and everybody dies at age 80. Here is the approximate population of this "world" every 100 years.

Note that it takes only about 630 years to reach the present world population of 6 billion.

Examples of Humankind's Impact on the Environment
Chernobyl Reactor Explosion
Examples of Humankind's Impact on the Environment
Tropical Rain Forest Destruction
Examples of Humankind's Impact on the Environment
Exotic species invasions
Setting Priorities

- **Control population growth**
- **Lessen impact of technology**
- **Achieve sustainability**
- **Develop global cooperation**

Working Together

- **The only alternative to continued resource depletion is cooperation and a plan for long-term sustainability**
- **Problems must be addressed globally in the future**
- **Everyone must make a commitment to the future of the planet**
- **Accurate environmental education is absolutely critical**

Videos

- **Electromagnetic Fields**
- **Drug-resistant Salmonella**

Quizzes

ELECTROMAGNETIC FIELDS AND CANCER

Answer the following.

1. **What creates electromagnetic fields of the type studied in research described in the video?**
2. **What biological effects did the researchers actually document in humans exposed to low-level electromagnetic fields?**
3. **What effects do the researchers speculate may be tied to exposure to electromagnetic fields?**
4. **Describe the relevant evidence from animal studies.**
5. **Why has it been difficult to study the links between environmental factors and cancer?**

Answers

ELECTROMAGNETIC FIELDS AND CANCER

1. **Small appliances and power lines.**
2. **Exposure to electromagnetic fields decreases melatonin secretion.**
3. **It may also decrease secretion of other hormones, including estrogen, and may lead to an increased risk of breast cancer.**
4. **In rats, decreased melatonin increases the risk of breast cancer.**
5. **It is difficult to quantify the levels of exposure to environmental factors.**

Quizzes

DRUG-RESISTANT SALMONELLA

Answer the following.

1. **Why is the *Salmonella* strain DT104 considered a threat to human health?**
2. **How do scientists think this strain arose?**
3. **How could a person become infected with DT104?**
4. **What is the incidence of drug-resistant *Salmonella* among the cases reported to the Centers for Disease Control?**
5. **How could the rise of antibiotic resistant strains be avoided in the future?**

Answers

DRUG-RESISTANT SALMONELL

1. **DT104 is resistant to five common antibiotics. It is still susceptible to one antibiotic, but scientists fear it may yet become resistant to that.**
2. **Scientists believe the strain arose in livestock that were routinely fed antibiotics to enhance growth. This caused antibiotic resistance.**
3. **People can become infected by eating undercooked meat from an animal that was infected.**
4. **Ten percent (10%) of the Salmonella cases reported to the CDC are drug resistant.**
5. **Antibiotics should be used only when absolutely necessary. They should not be routinely fed to animals.**