CE 110 Introduction to Environmental Engineering (3)

Fall 2010 Syllabus

Lecture Class	Monday and Wednesday	3:30 - 4:45 pm	KAP 163	
Discussion Class	Monday	5:00 - 5:50 pm	KAP 163	
Professor	**Dr. P.** — Professor Mike Pirbazari, Ph.D.			
Office	KAP 260			
Phone	213-740-0592			
Email	pirbazar@usc.edu			
Office Hours	Mon. 1:00 – 2:30pm	Tues. 4:00 – 7:00pm	Fri 2:00 to 5:00pm	By appointment
Class Webpage	www.usc.edu/dept/civil~eng/dept/ce110			
Teaching Assistant	TBD			
Office				
Phone				
Email				
Office Hours				
Required Textbooks	Miller, Jr., G.T., and Scott Spoolman Environmental Science: Principles, Connections, and Solutions, Wadsworth Publishing Co., Belmont, CA, 2010. ISBN: 9780495560166			
	Wolf, E.C., Race to Save the Planet, Wadsworth Publishing Co., Belmont, CA, 2008. ISBN: 9780534396121			
Reference (design text)	Hammer, M.J., and Hammer, M.J. Jr., Water and Wastewater Technology, Pearson Prentice Hall, 2007			
Class Description	Basic concepts of environmental engineering. Air, water, and soil pollution control technologies; pollution prevention strategies. Design of simple water distribution and treatment systems.			
Course Objectives	This course is intended to teach students the fundamental concepts in environmental engineering dealing with water, air, and land pollution, and other areas such as ecology, toxicology, global warming, ozone depletion, environmental regulations, mineral resources and energy resources, and pollution control technologies. The course will also include the following design components: • Design of small hydraulic systems used to transport water, and • Design of a small water treatment plant			

CE 110 Introduction to Environmental Engineering (3)

Fall 2010 Syllabus

Learning Objectives	Cooperative Learning Strategy: During the class, we will be practicing important concepts of skills of cooperative learning in small working groups of two to three students. This strategy is designed to increase your mastery of the course content. You will be expected to actively participate in an effort to ensure yours and your teammates' understanding of the ideas presented in the class. We need your commitment to demonstrate a willingness to contribute ideas, to listen to others, and to be a constructive force in the learning process.

Final grade schema is based on the following percentages of graded coursework :

Homework	15 %	
Quizzes	20 %	(4 @ 5 points each)
Midterm	15 %	
Term Project	15 %	
Final Exam	25 %	
Class Participation	10 %	
Total	100 %	

Schedules for Exams and Quizzes

Schedule	Date	Material
Quiz 1	9/08	Chapters 1 & 2; Unit 4
Quiz 2	10/29	Chapters 3, 5, and 11(part 1) Unit 5, and design problems
Midterm	10/25	Chapters 1,2,3,5,11, and design problems
Quiz 3	11/08	Chapters 12 & 13 (part 1) and design problems
Quiz 4	11/22	Chapters 13 (part 2) and 15; Unit 10 and design problems
Term project presentation	11/29	Student Presentations
Term project presentation	12/01	Student Presentations
Final exam	12/13 (2:00 – 4:00 p.m.)	Chapters1,2,3,5,11,12,13 &15; Units 4,5 & 10 and design problems

Topics Covered

Environmental Problems, Their Causes and Sustainability (0.5 week)

- Living More Sustainably
- Population Growth, Economic Growth, Economic Development
- Environmental Problems: Causes and Connections
- Is our Present Course Sustainable?

Science, Matter and Energy (1.5 weeks)

- Science, Technology, and Environmental Science
- Models and Behavior Systems
- Matter and Energy: Fundamental Concepts
- Law of Conservation of Matter
- Fundamental Laws of Energy
- Nuclear Changes
- Matter and Energy Change Laws and Sustainability
- Matter Cycling in Ecosystems (Biogeochemical Cycles)
    - The Water Cycle
    - The Carbon Cycle
    - The Nitrogen Cycle
    - The Phosphorus Cycle
    - The Sulfur Cycle

Climate and Biodiversity (1 week)

- Climate and Factors Affecting It
- Climate and Life on Land
- Aquatic Environments
    - Saltwater Life Zones (Estuaries, Coastal Wetlands, and Mangrove Swamps)
    - Freshwater Life Zones (Lakes, Streams, Freshwater Wetlands)

Geology and Nonrenewable Mineral Resources (1 week)

- The Nanotechnology Revolution
- Earth's Major Geological Processes
- Harmful Effects of Using Mineral resources
- Mining and It's Harmful Environmental Effects
- Sustainable Use of Mineral resources (Figure 12-14)
- Nanotechnology and sustainability

Energy (2 weeks)

- Evaluation Energy Resources
- Nonrenewable Fossil Fuels
  - Oil
  - Natural Gas
  - Oil Sand and Oil Shale
  - Coal
- Nonrenewable Nuclear Energy
- Improving Energy Efficiency
- Geothermal Energy
- Sustainable Energy Strategies

Air Pollution (1 week)

- Structure and Science of the Atmosphere
- Outdoor Air Pollution
- Photochemical and Industrial Smog
- Indoor Air Pollution
- Harmful Effects of Air Pollution
- Preventing and Reducing Air Pollution
- Air Pollution Control Technologies

Climate Change and Ozone Loss (1 week)

- Past Climate Change and the Natural Greenhouse Effect
- Climate Change and Human Activities
- Factors Affecting the Earth's Temperature
- Dealing with the Threat of Global Warming
- Ozone Depletion in the Stratosphere
- Protecting the Ozone Layer

Hydraulics of Water and Wastewater Transport Systems (2 weeks)

- Pressure-Velocity-Head Relationships
- Flow in Pipes under Pressure
- Gravity Flow in Circular Pipes
- Storm Water Runoff Calculations

Water Resources and Water Pollution (2 weeks)

- Importance and Unique Properties of Water
- Supply, Renewal, and Use of Water Resources
- Problems Relating to Water Resources and Possible Solutions
- Pollution of Streams, Lakes, and Groundwater
- Marine Pollution
- Solutions to Water Pollution Problems

Drinking Water Treatment Plant Design (2 weeks)

- Understanding turbidity, natural organic matter (NOM), trihalomethanes (THMs), haloacetic acids (HAASs), and disinfection
- Chemical Coagulation and Flocculation Process:
  - Rapid-Mix Tank: determining size and shape
  - Flocculation Tank: determining size and shape
  - Sedimentation Tank: determining size and shape
  - Dual-media filter: determining size and shape:
  - Chlorination Tank: determining size and shape

Solid and Hazardous Waste (1 week)

- Solid Waste in the United States
- Reuse
- Recycling
- Incinerating and Land Filling Solid Wastes
- Hazardous Waste Management
- Toxic Metals
- Achieving Low-Waste Society

Notes:

Any student requesting academic accommodation based on disability is required to register with Disability Services and Programs Office (DSPO) each semester. A letter of verification for approved accommodations can be obtained from DSPO. Please be sure the letter is delivered to the instructor (or the TA) as early in semester as possible. DSPO is located in STU 301 and is open 8:30am – 5:00pm, Monday through Friday. The phone number for DSPO is (213) 740-0776.

Term Project

Each student will be required to present a term project, which will constitute 15% of the semester grade. A list of suggested topics is provided on the next page. Students are required to submit a choice of topic by September 15th, 2010.

A 20-minute PowerPoint presentation on the term project topic is mandatory. Student presentations will be made in class on Nov. 29th and Dec. 1st and, 2010. A sign up sheet will be passed around in class Nov. 22nd, 2010.

Suggested Topics

1. Ocean Energy: Using the ocean's tides, waves, and heat to generate electricity
2. Seawater desalination
3. Technologies for removing arsenic from water supplies in rural areas of Developing Countries
4. Using solar energy to provide heat and electricity for homes
5. Coral Reefs: Formation mechanisms, causes of destruction, preventive strategies, restoration techniques
6. Ocean Pollution: Sources of pollution, preventive measures, remedial strategies
7. Climate Change: Sources of greenhouse gases, anthropogenic causes of global warming, factors affecting global warming, reducing the threats of global warming
8. Removing and Storing Carbon Dioxide (Carbon Sequestration): Technology evaluations and economic considerations
9. Sustainable Cities: Discussing and evaluating sustainable living programs in the United States
10. Using Wetlands to Clean Sewage and Storm Water
11. Using Bioenergy for Hybrid Vehicles
12. Using Nanotechnology for Groundwater Cleanup

Effective Class Participation

Please note the following suggestions for effective class participation:

1. Make every effort to interact with your **class partner(s).**
2. Try to stay **active** throughout the class period.
3. Don't hesitate to ask **questions** in class.
4. **Share** your ideas with the rest of us.
5. Don't hesitate to ask the instructor to **repeat** himself.
6. Keep an eye on your partner not to **fall asleep** in class!!
7. Try to bring **new** ideas to class.
8. Don't read unrelated materials in class.
9. Share your **ideas** for class improvement with your instructor.
10. Put your **fair share** of efforts in preparing the term projects and the term paper.
11. Be **cooperative** at all times.
12. Discuss your term paper and term project with the instructor **periodically.**
13. Come to class **prepared.**
14. Help your instructor make the class **interesting.**
15. Discuss your **concerns and problems** (if any) about the course with the instructor. He will do his best to accommodate your suggestions.
16. **Late homework is not accepted.**
17. **Use of Lap tops in class is not** permitted**.**
18. **Tardiness is** unacceptable**.**