CE 421/521

Environmental Biotechnology

CE 421/521 Introduction

- Index Card:
  - Name, phone, email
  - Major
  - year at ISU
  - Hometown
- What you would like to learn in this class
- What you think the most serious environmental problem is
- What you like to do in your spare time

CE 421/521 Introduction

- Find the person with the same number in the right hand corner of your index card.
- Take a few minutes to interview them.
- Introduce them to the class.

CE 421/521 Introduction

- Get into your discussion groups as follows:
  - Group 1: index card no. 1 & 2
  - Group 2: index card no. 3 & 4
  - Group 3: index card no. 5 & 6
  - Group 4: index card no. 7 & 8
- Prepare to debate the following statements

Debate Topics

"Due to the current energy crisis, ethanol produced from agricultural products (e.g., corn) is a viable substitute for oil."

Group 1 in favor, Group 2 against

"Due to man's activities our global temperature is increasing at an alarming rate and we must do something to stop it."

Group 3 in favor, Group 4 against

Syllabus

Week	Date	Topic	Reading Assignment
		Fundamentals of Microbiology	
1	Aug 22, 24	Introduction/The Cell	1-15, 65-79
2*	Aug 29, 31	Energy and Metabolism, Genetics	85-115, 116-141
3*	Sep 5, 7	Microbial Groups	217-288
4*	Sep 12, 14	Quantifying Microorganisms and Their Activity	290-340
5	Sep 19, 21	Microbial Transformations/First Exam	387-440
		Public Health Microbiology	
6*	Sep 26, 28	Effect of Microbes on Human Health	342-382
7*	Oct 3, 5	Indicator Microorganisms and Disinfection	382-385, 662-668
		Water and Wastewater Treatment	
8*	Oct 10, 12	Potable Water Treatment	659-662/notes
9*	Oct 17, 19	Wastewater Treatment/Field Trip	577-617/notes
10*	Oct 24, 26	Wastewater Treatment/Stoichiometry and Kinetics Lab	617-633/notes
11	Oct 31, Nov 3	Wastewater Treatment/Biological Nutrient Removal/2nd Exam	633-636
12	Nov 7, 9	Sludge Treatment/BioWin lab	636-659
13	Nov 14, 16	Anaerobic Processes	notes
	Nov 21, 23	**Thanksgiving Break**	
14	Nov 28, 30	Student Reports	
15	Dec 5, 7	Student Reports	
	TBA	Final Exam	

Syllabus cont'd - 521

Text: Environmental Biology for Scientists and Engineers, Vaccari, Strom, and Alleman, Wiley and Sons, 2006
Supplementary texts: Biological Wastewater Treatment, 2nd ed., by Grady, Daigger, and Lim, Marcel Dekker, 1999

Grading:		
	2 exams @ 20% each	40%
	Final exam	25%
	Weekly Abstracts and Class Participation	15%
	Term Paper	20%

Assignments:

1. Prepare a one page critique of a current (2005-2006) literature article every week (except exam weeks). This paper will be due every Tuesday at class time (see * weeks). Email submission is preferred.
2. Conduct a literature review and prepare a term paper (10 to 15 pages) on a selected topic (not related to your thesis) involving an environmental biotechnology application. The term paper topic will be due September 5, outline due Sept. 12, list of references and citation search due Spet 26, first draft due Oct. 31 and final paper will be due Nov. 16. These are strict deadlines and missed dates will cause a decrease in the term paper grade.
3. In small groups (2- 4), lead a discussion of a current environmental research article. Each group will be responsible for leading at least one discussion. It is expected that everyone in the class will have critically read the article prior to the discussion. Literature discussions will be held on Thursdays.

Instructor: Tim Ellis tge@iastate.edu course web page: www.ccee.iastate.edu/courses/ce521/homepage.html
375 Town 294-8922 Office Hours: M: 10-11, R:11-12
Visiting Professor: Dr. Ilter Aydinol, 355 Town, 294-3563 ilter@iastate.edu

Syllabus cont'd - 421

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Supplementary texts: Biological Wastewater Treatment, 2nd ed., by Grady, Daigger, and Lim, Marcel Dekker, 1999

Grading:		
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	Final exam	25%
	Weekly Discussions and Class Participation	15%
	Term Paper	20%

Assignments:

1. Conduct a literature review and prepare a term paper (10 to 15 pages) on a selected topic involving an environmental biotechnology application. The term paper topic will be due September 5, outline due Sept. 12, list of references and citation search due Sept 26, first draft due Oct. 31 and final paper will be due Nov. 16. These are strict deadlines and missed dates will cause a decrease in the term paper grade.
2. In small groups (2-4), lead a discussion of a current environmental research article. Each group will be responsible for leading at least one discussion. It is expected that everyone in the class will have critically read the article prior to the discussion. Literature discussions will be held on Thursdays. The lead group will be responsible for providing a written summary of the discussion, due the following week.

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Introduction

- Perspectives on biology
  - Why environmental engineers should study biology

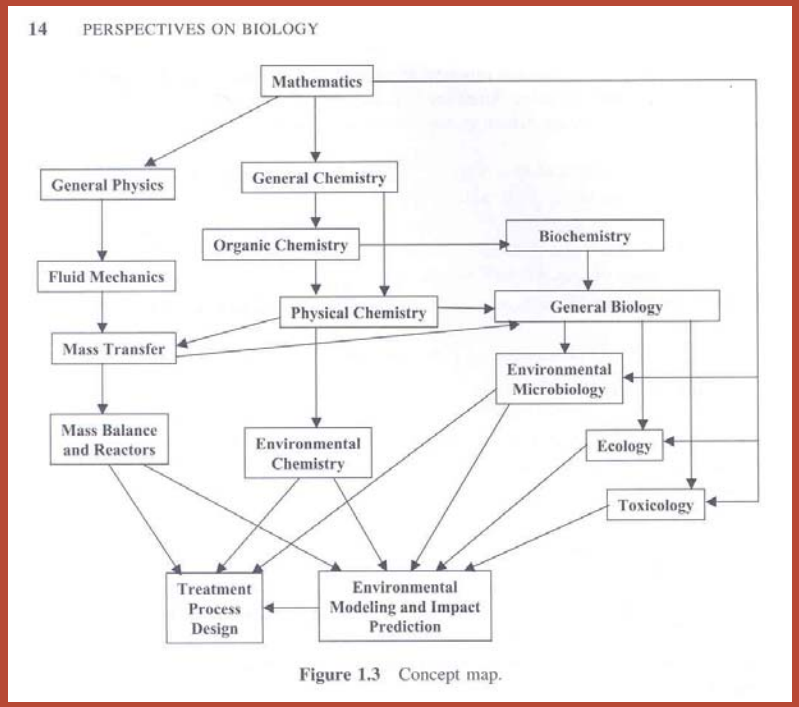

Figure 1.3 Concept map.

Introduction

- Paradigm of scientists versus engineers
  - Scientists study a problem
  - Engineers design a solution

Introduction

- Environmental ethics “According to Leopold human use of land should preserve and enhance the diversity, integrity, stability, and beauty of the biotic community.”

Environmental Ethics

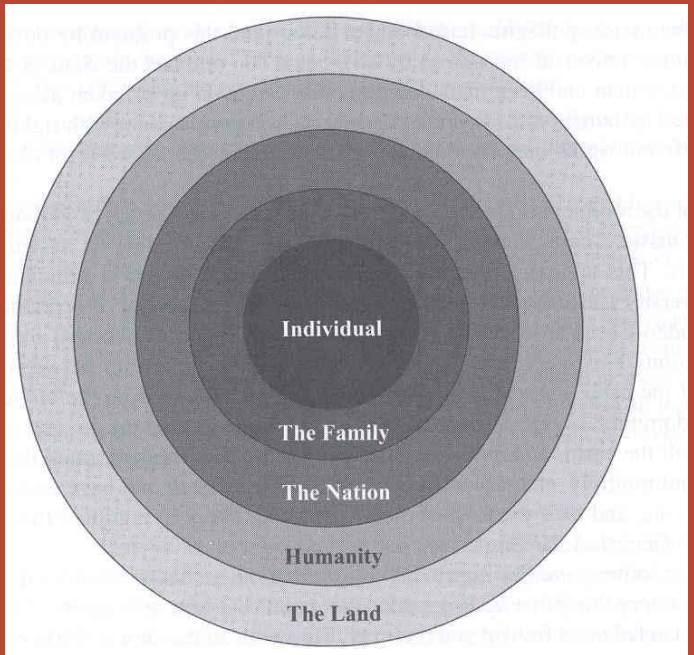

Figure 1.2 Hierarchy of responsibility in the land ethic.

- As engineers we have to make decisions that will balance the cost of a project or activity and the resulting environmental impact(s).

Environmental Ethics

- ASCE code of conduct:
  - Engineers uphold and advance the integrity, honor, and dignity of the engineering profession by using their knowledge and skill for the enhancement of human welfare.
  - Engineers shall hold paramount the safety, health, and welfare of the public in the performance of their professional duties
  - Engineers should be committed to improving the environment to enhance the quality of life.

Assignment for Thursday

- Read chapters 1 & 4
- Each discussion group should bring in copies of three or four current (2005 or 2006) research journal articles that would be good for class discussion. Articles should involve some element of environmental ***bio***technology.