Boston University College of Engineering

EK 335
Recommended Prerequisites: Chemistry, Calculus 3

Introduction to Environmental Engineering

Spring 2015

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Course Materials:

Textbook: *Environmental Engineering: Fundamentals, Sustainability , Design, 2nd Ed.* J.R. Mihelcic, J.B. Zimmerman. Wiley. U.S.A. 2014. **Print Only.** (Note: this book will be used daily in class and on exams)
Website: Blackboard
Class: Tuesday and Thursday 4-5:50pm, Photonics 205

Course Description: This course integrates engineering principles and fundamentals from the natural sciences, with policy analyses to solve real-world problems that impact three major environmental compartments: air, water, and soil. Through a case-study, active-learning approach, students will quantitatively understand and analyze environmental issues such as: the impact of energy on water quality; anthropogenic versus natural air pollution; mitigating environmental disasters and improving global access to clean water. 4 cr. **This is an active-learning course with minimal traditional lecturing. Students must come to class prepared every day; attendance is required and in-class assignments will form a large portion of the course grade.**

Topics Covered:

1. Units of Measurement and Material Balances
2. The Hydrologic Cycle
3. Freshwater Bodies
4. Drinking Water Treatment
5. Wastewater Treatment
6. Sources and Health Effects of Air Pollution
7. Dispersion of Air Pollutants
8. Control of Power Plant Emissions
9. Indoor Air Pollution
10. Solid Waste Management

Reading Assignments and Blackboard Quizzes: Course lectures will coincide with the text and supplemental material indicated on the syllabus for that session. Students are expected to familiarize themselves with material before coming to class to fully engage in classroom discussions. As this course is taught in a hands-on, problem-solving approach, not doing the reading will be detrimental to your grade. To insure that students are taking this reading seriously, 5% of the course grade will be devoted to Blackboard quizzes on the reading each week. These are intended to test that you've learned the basics! **Not doing them will result in a grading penalty of one-half letter grade (5%)**.

Homework: There are 5 problem sets assigned throughout the semester due at the ***beginning*** of class on the date listed on the syllabus. Late homework will not be accepted (without prior approval of the instructor for extreme circumstances). You are encouraged to discuss/collaborate with classmates, but each student must write up his/her own individual solution.

In-Class Assignments: Class attendance is required to pass this course. Every class session work will be collected and graded; this is a studio-style, hands-on learning course. You are expected to come to class prepared to solve problems both individually and as a team. There is minimal traditional lecturing; **a large portion of your grade will come from in-class assignments**. Each in-class exercises will be graded; ***the lowest two (including any zeros from absences)*** will be dropped.

Exams: There will be 2 exams during the course of the semester. To be fair to all students, make-up or early exams are not an option for this course. Missing an exam due to vacation or early departure for a scheduled break is not excusable. Arrangements will be made on a case-by-case basis for documented medical/University conflicts or other emergencies. Students requiring additional time to complete examinations must supply proper documentation from Disability Student Services at ***least 3 days in advance*** of an examination to the instructor so suitable arrangements can be made. Exams are open textbook, open notes – PRINT COPY ONLY. Calculators are allowed during exams; all other electronic devices (cell phones, smart phones, laptops, tablets, etc., ***including electronic book copies***) are prohibited. *There is no final exam.*

Labs: There will be 2 experimental labs. Please note: these are not traditional lab reports – they will be hands-on experimental activities for which you will provide "real-world" reports to audiences that are NOT your instructor!! Assignments will be specific to each report – more information to follow.

Course Grading: Grading for ME419 is broken down as following:

Blackboard Quizzes:	5%
Homework:	10%
In-class Problem Sets:	35%
In-class Exams:	30%
Lab Reports:	20%
Total:	100%

Boston University Academic Conduct Code: Honesty is a core value of Boston University. Any violations of BU academic honesty and integrity standards ***will be pursued*** through appropriate University channels. This includes, but is not limited to: cheating, plagiarism and misrepresentation. If you have any questions as to what constitutes an honor code violation, please ask. ***Ignorance is not an excuse for cheating***. You may access the BU Academic Conduct Code at: http://www.bu.edu/academics/policies/academic-conduct-code/

Course Schedule:

(Please note: this schedule is subject to change based on course progress, weather, etc. Please check Blackboard for the most up-to-date information)

Lecture	Day	Date	Topic	Textbook Reading	Supplemental Material	Assignment Due
1	Tues	20-Jan	Earth: The Ultimate Mass Balance	Sec 2.1-2.2 (pg 38-44) Sec 4.1 (pg 116-122)		
2	Thurs	22-Jan	The Societal Engineer: Risk Perception and Evaluation	Sec 6.1 (pg 247-251) Sec 6.3-5 (pg 254-282)	"The Love Canal Tragedy" *EPA Journal.*	Blackboard Quiz - Submit by 12pm today
3	Tues	27-Jan	Drowning and Sinking: The Hydrologic Cycle ***Bring Laptop to Class***	Sec 7.1-7.4 (pg 298-316); Sec 3.2 (69-72); Sec 3.6.1 (80); Sec 3.7 (pg 83-86)	"The Water Cycle" by National Science Foundation (Video)	Blackboard Quiz - Submit by 12pm today
4	Thurs	29-Jan	Restoring Purity, Restoring Faith: River Pollution ***Bring Laptop to Class***	Sec 3.11 (101-108) Sec 4.1.3-4.1.5 (pg 122-137); Sec 7.7 (337-343)	"Case Study I: The Ganga, India" *Water Pollution Control*, World Health Organization	
5	Tues	3-Feb	Clean Up After Yourself! FRESHwater bodies	Sec 3.8-3.9 (pg 89-93) Sec 4.1.6 (pg 135-137) Sec 7.8 (pg 344-348)	"Microplastic Beads Pollute Great Lakes." *C&EN.*	Problem Set 1; Also- You really, really want to do the reading for today
6	Thurs	5-Feb	What's Down There Can't Stay There: Groundwater Contamination	Sec 3.10 (pg94-101) Sec 4.4.1 (pg 164-173) Sec 7.10 (pg 355-363)		Blackboard Quiz - Submit by 12pm today
7	Tues	10-Feb	Everyone's Thirsty: Supply, Demand, and Treatment	Sec 7.5-7.6 (pg 317-336) Sec 8.1-8.4 (pg 377-391)	"Water Sustainability for China and Beyond" *Science.*	
8	Thurs	12-Feb	It's a Process to be Potable, but Gravity and Chemistry Help	Sec 3.4 (pg 72-76) Sec 8.5-8.9 (pg 392-421)	"Disinfecting Water in an Emergency" *C&EN.*	Blackboard Quiz - Submit by 12pm today
	Tues	17-Feb	No Class - BU Monday			
9	Thurs	19-Feb	Fick's Law to Fix it: Mass Transfer Operations for Water Treatment	Sec 3.10 (pg 94-100) Sec 4.4 (pg 164-175) Sec 8.10-8.11 (pg 422-433)	"Understand the Basics of Membrane Filtration" *CEP.*	Blackboard Quiz - Submit by 12pm today
10	Tues	24-Feb	Toilet to Tap: Wastewater Treatment Processes	Sec 3.11 (pg 101-108) Sec 9.1-9.5 (pg 442-445)		Problem Set 2
11	Thurs	26-Feb	The Bio-logic of Secondary Wastewater Treatment	Sec 5.3-5.4 (pg 205-224) Sec 9.6-9.8 (pg 456-473)		Blackboard Quiz - Submit by 12pm today
12	Tues	3-Mar	The End of the, er, Pipe: Disinfection and Sludge Recovery	Sec 9.10-9.12 (pg 480-496)		Lab 1 - Water Quality
13	Thurs	5-Mar	**Exam 1**			
	Tues Thurs	10-Mar 12-Mar	No Class - Spring Break			
14	Tues	17-Mar				
15	Thurs	19-Mar				Blackboard Quiz - Submit by 12pm today
16	Tues	24-Mar				
17	Thurs	26-Mar				Problem Set 3
18	Tues	31-Mar				Blackboard Quiz - Submit by 12pm today
19	Thurs	2-Apr	Syllbaus to be continued with reading assignments before Spring Break.			Blackboard Quiz - Submit by 12pm today
20	Tues	7-Apr				Blackboard Quiz - Submit by 12pm today
21	Thurs	9-Apr				Blackboard Quiz - Submit by 12pm today
22	Tues	14-Apr				Problem Set 4
23	Thurs	16-Apr				Blackboard Quiz - Submit by 12pm today
24	Tues	21-Apr				Lab 2 - Indoor Air Quality
25	Thurs	23-Apr				Blackboard Quiz - Submit by 12pm today
26	Tues	28-Apr				Problem Set 5
27	Thurs	30-Apr	**Exam 2**			