

CE 370 – INTRODUCTION TO ENVIRONMENTAL ENGINEERING

The Pennsylvania State University Summer 2021

Lecture: Online via Canvas: <https://lmstools.ais.psu.edu/canvasauth/index.html>

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Textbook: Introduction to Environmental Engineering and Science, 3rd edition, 2008, Gilbert Masters and Wendell Ela, Prentice-Hall, ISBN 0-13-148193-2.

Course Objectives: 1) Develop students' environmental ethics, literacy, and an appreciation for the environmental impacts of their future careers; 2) Prepare students for the Environmental Engineering section of the FE/EIT exam by introducing them to the basic principles of science and engineering pertinent to the natural and engineered environment; and 3) Discuss the various classes of environmental pollution and introduce a variety of traditional and alternative methods available to prevent and remediate their presence.

Lecture materials: The majority of lectures will be conducted using PowerPoint, with fill-in-the-blank sections for problem solving, etc. Copies of the PowerPoint slides (without the blanks filled in!) will be posted on the course web page (canvas.psu.edu). You are strongly encouraged to print these out and fill them in as you review the lectures, as they will significantly reduce your time spent on taking notes, and (hopefully) increase your time spent thinking about the material.

Grading:	Exams (2)	= 300 points	≈ 42%
	Quizzes (6)	= 300 points	≈ 42%
	Homework (6)	= 120 points	≈ 16%
	Total	= 720 points	= 100%

The standard grading system will be used to assign final letter grades in the course (A = 94 – 100%; A- = 90 – 93%; B+ = 87 – 89%; B = 84 – 86%; B- = 80 – 83%; C+ = 76 – 79%; C = 70 – 75%; D = 60 – 69%; F = 0 – 59%).

Homework: Six homework assignments, each worth 20 points, will be given over the course, one each week, to help you learn the material and prepare for quizzes and exams. Numerical answers to quantitative problems will be provided to help you check your work. All homework assignments should be scanned and uploaded to Canvas as a PDF (using a phone app like CamScanner is fine) by **11:59pm EDT on the due date**. Late homework assignments will be penalized 20% for each 24 hour period (or any fraction of 24 hours, not pro-rated) that they are late (for example, if you submit an assignment 10 minutes late, you will receive -20%). Quantitative homework problems should be typed or completed on engineering paper (or the equivalent) with **a box placed around the final answer**. You must show your work (i.e., each step) to receive credit. **Answers to essay questions must be typed**. Professional language style, grammar, punctuation, and neatness count, and may be penalized at the discretion of the grader.

Quizzes: Six quizzes, each worth 50 points, will be given over the course, one each week. All quizzes must be completed in Canvas within the specified time window on the quiz date. (Note: the time window for quizzes will be determined based on the time zones of the class participants.) Makeup quizzes will only be arranged for students with valid excuses provided at least one week before the scheduled quiz. If you have a valid conflict, please let me know as soon as possible.

Exams: Exams will be based on material from lecture notes, homework, and quizzes. Exams will be closed-book and closed-notes, but governing equations will be provided. Exams must be completed by

11:59pm EDT on the exam date. Makeup exams will only be arranged for students with valid excuses provided at least one week before the scheduled exam. If you have a valid conflict, please let me know as soon as possible.

Midterm Exam – July 23 (Friday)
Final Exam – August 13 (Friday)

Academic Integrity: Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others. In this course, original solutions from each student are required. If cheating or copying is suspected, all students involved will receive a zero for that assignment. **Cheating or plagiarism** on any graded activity (homework, exam, etc.) will be penalized with a minimum of a zero points for the assignment, and up to a **failing grade** in the class. I will also place academic integrity violation reports in the offenders' permanent files. If you are not familiar with what constitutes an academic integrity violation, I encourage you to read Penn State's policies on the following web site: <http://www.engr.psu.edu/CurrentStudents/acadinteg.asp>.

Disability Accommodation: Penn State welcomes students with disabilities into the University's educational programs. To receive consideration for reasonable accommodations, you must contact the appropriate Office for Disability Services (ODS) at the campus where you are officially enrolled (<http://equity.psu.edu/ods/dcl>), participate in an intake interview, and provide documentation (<http://equity.psu.edu/ods/doc-guidelines>). If the documentation supports your request for reasonable accommodations, your campus's ODS will provide you with an accommodation letter. Please share this letter with me and discuss the accommodations as early as possible.

Counseling and Psychological Services: Many students face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

[Counseling and Psychological Services at University Park \(CAPS\)](#): 814-863-0395
Penn State Crisis Line (24 hours/7 days/week): 877-229-6400
Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

Educational Equity / Report Bias: Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity via the [Report Bias webpage](#).

CE 370 – TENTATIVE COURSE SYLLABUS

SUMMER 2021

Dates	Lecture Number, Topic	References	Deliverables
Week 1 (June 30 – July 6)			
	L1: Introduction; What is Environmental Engineering?	Handout	HW #1 (T, July 6) Quiz #1 (W, July 7)
	L2: Environmental Ethics; Hannover Principles; NEPA; Environmental Impact Statements	Handout	
	L3: Water Resources; CWA/SDWA	§5.1 – 5.3	
	L4: Water Pollutants; Surface Water Quality	§5.4 – 5.5	
	L5: Effects of Wastes on Rivers; BOD calcs; DO sag curve	§5.6 – 5.6	
Week 2 (July 7 – 13)			
	L6: Exponential Growth; Resource Consumption	§3.1 – 3.3	HW #2 (T, July 13) Quiz #2 (W, July 14)
	L7: Population Growth; Human Population Growth	§3.4 – 3.5	
	L8: Environmental Chemistry: Units; Stoichiometry; Oxidation Reactions (CBOD, NBOD, ThOD)	§1.2; 2.1 – 2.2	
	L9: Chemical Equilibria: Acid-Base Reactions; Solubility Product; Henry's Constant	§2.4	
Week 3 (July 14 – 20)			
	L10: The Carbonate System & Alkalinity	§2.4	HW #3 (T, July 20) Quiz #3 (W, July 21)
	L11: Acid Mine Drainage: Chemistry & Remediation	§2.4	
	L12: Mass Balances	§1.3	
Week 4 (July 21 – 27)			
F, July 23	Midterm Exam		Exam I
	L13: Water quality standards; SDWA; MCLs	§6.1 – 6.3	HW #4 (T, July 27) Quiz #4 (W, July 28)
	L14: Water Treatment (WT): Coagulation; Flocculation	§6.4	
	L15: WT: Sedimentation; Filtration	§6.4	
	L16: WT: Disinfection; Hardness; Softening	§6.4	
	L17a: WWT: Wastewater characteristics; CWA; municipal wastewater treatment (WWT)	§6.5	
Week 5 (July 28 – Aug 3)			
	L17b: WWT: Physical processes	§6.5	HW #5 (T, Aug 3) Quiz #5 (W, Aug 4)
	L18a: WWT: Biological Processes intro & 18b: calcs	§6.5	
	L18c: Sludge treatment and disposal	§6.5	
	L19: Advanced WWT, Nutrient removal, Disinfection	§6.5	
	L20: Eco-Machines	Handout	
Week 6 (Aug 4 – Aug 11)			
	L21: Hazardous Waste – Case studies; RCRA; Superfund Brownfields; Employment opportunities	§6.6 – 6.7	HW #6 (T, Aug 10) Quiz #6 (W, Aug 11)
	L22: Risk Perception & Human Exposure Assessment	§4.1 – 4.4, 4.7	
	L23: Geohydrology & Contaminant Transport	§5.8 – 5.12	
	L24: Hazardous Waste Treatment & Remediation	§6.8, 5.16-5.17	
	L25: Solid waste management; Life-cycle Assessment; Green Design; Recycling	§6.9, 9.4, 9.6, 9.8	
	L26: LEED Rating System for Green Building Design	Handout; §7.12	
F, August 13	Final Exam		Final Exam