Syllabus – Introduction to Environmental Engineering – CEE 361 – Fall 2017

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Course Email: cee361.fall2017@gmail.com Use this Email address for all class business. The most-appropriate person will respond.

Office Hours: Regular: Tuesday, 3:00 - 5:00 pm, Biodesign A262. Wednesday, 1:30 – 3:30 pm, Biodesign B204. (These rooms are located on the second floor across from the break area between Biodesng A and Biodesign B.)
By Appointment: Please contact Dr. Rittmann, Dr. Krajmalnik-Brown, or a TA, by the course email or in class to arrange an appointment.

Course Times: Lecture: Tuesdays & Thursdays, 1:30 pm to 2:45 pm in COOR 199
Quiz/Lab/Discussion: Fridays, 9:00 - noon in LSE 106 to begin, but with wet-lab sessions that meet in ECD 110.

Course Content: This course introduces the most essential elements of environmental engineering to junior- and senior-level civil engineering students, although other students are welcome. The course provides a fundamental basis from which to understand and evaluate the environment and design engineered systems for environmental quality control. Critical evaluation of contemporary issues concerning our environment and how environmental engineers interact with these issues will be incorporated into the class in lecture and through the lab/recitation periods.

Consistent with ABET criteria are the following **course objectives:**

1) You will demonstrate a familiarity with the scope and purpose of environmental engineering.
2) You will demonstrate a knowledge of water and air quality parameters and an understanding of the associated chemistry and biology.
3) You will demonstrate the application of basic mass balances, reactor theory, and transport theory required to solve quantitative water and air quality problems and design environmental reactors.
4) You will critically evaluate and discuss contemporary environmental issues that are of concern as an environmental engineer and as a citizen.
5) You will work in teams and communicate (written and oral) information that applies knowledge gained in this course to environmental issues.

Text: One textbook is required for this course: James R. Mihelcic and Julie B. Zimmerman, *Environmental Engineering: Fundamentals, Sustainability, Design,* 2nd edition, Wiley (2014). The book is available at the ASU Bookstore. Here are some additional, fundamental references that are not required, but may help in this class and in your engineering careers:

Additional introductory text on environmental engineering: G.M. Masters and W.P Ela, *Introduction to Environmental Engineering and Science*, 3rd ed., Prentice-Hall, Upper Saddle River, NJ, (2008).

Fundamental reference on writing: Strunk, W., Jr. and E.B. White, *The Elements of Style*, Latest edition, MacMillan Publishing Co., Inc., New York

Fundamental laboratory analysis reference for environmental engineers: *Standard Methods for the Examination of Water and Wastewater*. 20th Edition. American Public Health Association (1998). (A later edition is available.)

Fundamental reference for wastewater treatment: Metcalf and Eddy, Inc. *Wastewater Engineering: Treatment, Disposal, and Reuse,* Fourth Edition. McGraw-Hill, New York (2003).

Fundamental reference for drinking water treatment: James M. Montgomery Consultants. *Water Treatment Principles and Design*. Second Edition. John Wiley and Sons, New York. (2005)

Fundamental reference for groundwater remediation: Montgomery, J.H. (2000) *Groundwater Chemicals Desk Reference.* Third Edition, CRC Lewis Publishers, Boca Raton.

Fundamental reference for air quality engineering: Seinfeld, J.H., and Pandis, S.N. (1998) *Atmospheric Chemistry and Physics: from Air Pollution to Climate Change*. John Wiley and Sons, New York.

Course Information: The course syllabus, schedule, homework assignments, quiz solutions, and other supplemental material will be posted on the courses web page via Blackboard at my.asu.edu. You are responsible for the material posted on the web page and presented in lectures and lab/recitations. **In particular, you must bring with you the materials in the course syllabus that are relevant to each day's lecture.** These materials include key graphics, example problems, and example quizzes. You may wish to bring the materials on paper or in electronic format on your computer or tablet. In any case, you will need the materials is class.

Workload: Reading assignments, homework, and quizzes occur on a weekly basis. Homework and quizzes are graded and returned, and the scores constitute pare of your grade. One mid-term exams and one final exam also are used as evaluation tools.

Reading Assignments. Reading assignments from the textbook are assigned for each class. You are responsible for reading this material **BEFORE** class of the specified due date. You are wise to **review** this material **again after the lecture**.

Homework Assignments. Weekly problem sets are due each Thursday, beginning August 24. Completing these assignments comprises an important portion of this class and will be required preparation for the quizzes and exams. Weekly assignments will be posted on the course web page, and solutions also will be made available on the web page after the grading is completed. Homework is due at the end of class on the due date. No late homework will be accepted without prior approval. Graded homework will be returned in class on the Tuesday following the Thursday it is turned in.

We encourage you to work together on homework. Peer teaching is a great learning strategy. However, you must come up with you own solution to the problems. Turning in an exact copy of your classmates' homework is not acceptable.

We would like your homework solutions to follow a specific format. For full credit on your homework, please follow this format.

1. State the **objective** of the problem in your own words. For example, *"The objective of problem #2 is to determine the total mass (in kg) of carbon dioxide emitted from my Hummer during my 19-mile commute to school each day and over the time I am a student."*

2. Identify the physical setting of the problem using a well-labeled figure of the system or a brief statement of the physical setting: list of important parameters, dimensions, constants, etc.
3. Solve the problem showing all assumptions and without skipping any steps. Make sure that all parameters have clearly indicated and correct units. Include a brief running summary so that we can follow exactly what you have done.
4. **BOX all Answers,** and call attention to important intermediate results.
5. Discuss briefly (e.g., one complete sentence) the significance of the results. For example, *"My carbon dioxide emissions from driving my Hummer over my time as a student is approximately equal to flying a Boeing 777 from PHX to DCA."*

Quizzes. Short (15 - 25 min.) quizzes will be given most weeks at the beginning of the quiz/lab/discussion period, starting on September 1. These quizzes cover the material of the homework assignment returned on the preceding week. For example, H1 is due on August 24, it will be returned on August 29, and Q1 will be given on September 1. Quizzes may require verbal and mathematical proficiency and will be based largely on homework problems, examples in class, and reading. Please bring a calculator. Quizzes are open book, open notes. **The only electronic devices allowed will be a calculator or another electronic device that is not connected to the internet**. **Access to the Internet will not be allowed.**

Midterm Exam. One mid-term exam will be given; consult the course schedule for the date. The exam will be open book and open notes. Students may not use anything belonging to another student and may not give or accept assistance during an exam. The only electronic devices allowed in exams will be a calculator or another electronic device that **is not connected to the internet**. Access to the Internet will not be allowed. This exam will have problems that require quantitative and verbal proficiency.

Final Exam. A final exam will be given with same rules as the mid-term exam. It will focus on the materials after the mid-term exam. The final exam is scheduled for Thursday, December 6 from 12:15 pm until 2:00 pm, and it will be held in COOR 199. Same rules as quizzes and midterms apply.

Students who have performed well throughout the course may opt out of the final exam. This is an incentive for every student to do well from the very beginning of the class. A student may opt out of the final exam if s/he has an average of at least 80% on the quizzes (top eleven scores out of twelve quizzes) and a score of at least 80% on the mid-term exam. Students not meeting these criteria must take the final exam to demonstrate competence. Students meeting the criteria are allowed to take the final exam, e.g., to improve one's grade or for the fun of it.

Quiz/Lab/Discussion. Most Friday periods (from 9:00 am) will be quiz/lab/recitation following the format described below:

~ The first 15-25 minutes will be devoted to a quiz on the content of the previous homework assignment. The solution will be posted immediately after the quiz. Thus, it is not possible to make-up a quiz. Do everything possible to take each quiz. We anticipate having 11 quizzes, and the lowest quiz score will be dropped. If you miss a quiz this will be the one you drop.

~The next 30-45 minutes will involve either (1) analysis of a contemporary article from a newspaper or other media source, or (2) a simple information-gathering exercise (via the Internet) about a topic relevant to the course and the class. For item (1), we will provide the reading after the quiz. Each student will have time to read it; then, we will have a plenary discussion. For item (2), we will provide the objective of the exercise and some ideas about where to find good information, and you will want to bring a computer or tablet so that you can link to the Internet. For both situations, each student will turn in a set of written responses.

~ We will have wet laboratories running on Fridays beginning September 8 and running through October 20. Due to the finite capacity of the laboratory facility, we will divide the class into three groups.

Students doing the wet laboratory will be excused from the discussion that day, but will take the quiz. Students not in a lab group that day will do the quiz and discussion. The detailed plan for the laboratory sessions will be provided in a separate document once the enrollment in the class is known.

~In a few cases, the format will differ. We will have a special discussion session on August 18 and a practice quiz (plus discussion) on August 25. The mid-term exam will be on October 6. A non-wet laboratory session will be on November 3. November 17 and December 1 will feature field trips. Please refer to the course schedule for details.

Evaluation. Grades will be assigned based on weekly homework, quiz scores, participation in the lab/recitation and class sessions, and the midterm and final exams. Scores will be weighted to compute final grades as listed below:

15% Homework
20% Quizzes (the lowest score is dropped)
10% Lab reports and participation
15% Class participation, including attendance
20% Midterm exams
20% Final exam

Grading Scale. I will use the following grading scale:

A *Excellent* – Homework, quiz, lab, discussion, and exam scores greater than 90% of possible course points.

B *Good* – Scores between 90%-80% of possible course points.

C *Adequate* – Scores between 80%-70% of possible course points.

D *Poor* – We do not expect anyone to get a D or and E in this class. To do so, you will need to have an overall average below 60% for D and 50% for E

You may appeal grading. We will not alter the established grading criteria, but will re-grade your work in light of the criteria.

Participation. Your attendance at and participation in the class meetings and lab/recitation are necessary for you to have a good experience in the class and to help everyone else in the class have a good experience. We keep track of attendance and participation! We notice if you are present versus absent, paying attention versus surfing the net (or sleeping), and participating actively versus disengaged. We think you understand which are the good options. Engage in the good options.

We appreciate students who volunteer good questions or answers, and you may be called upon at any time whether or not you volunteer. You will also be required to work in groups and summarize group work in the lab/recitation period; being a good group member is essential.

Cell phones and pagers should be turned off during class to avoid distractions. The use of recording devices is not permitted without prior consent. Any violent or threatening conduct in class will be reported to the ASU Police Department and the Office of the Dean of Students.

Disability Accommodations. Suitable accommodations will be made for students having disabilities, and students should notify the Dr. Rittmann or Dr. Krajmalnik-Brown as early as possible if they require an accommodation. Such student must be registered with the Disability Resource Center and provide documentation to that effect.

Diversity. Engineers are expected to treat others fairly, with respect and courtesy, regardless of such factors as race, religion, sexual orientation, gender, disability, age, or national origin. In this class, you are expected to contribute to the overall campus climate such that others feel welcome, are respected, and are able to develop to their full

potential. This will allow each person to contribute to the success of the class as a whole. ASU, the Fulton School of Engineering, and the instructors are committed to maintaining a productive, enjoyable, and diverse campus environment.

Thinking critically and independently. It is our sincere hope that as a graduate of ASU, you will be a thoughtful citizen, as well as a fundamentally sound engineer. Many aspects of environmental engineering extend beyond traditional engineering and science fundamentals. As someone knowledgeable about the environment, you are empowered in a special way to serve human society and your fellow citizens of the world.

Academic integrity. All students in this class are subject to ASUs Academic Integrity Policy (available at http://provost.asu.edu/academicintegrity) and should acquaint themselves with its content and requirements, including its strict prohibition of plagiarism. By registration in this class, you are assumed to have read, understood, and agreed to this policy. All violations will be reported to the Dean's Office, which maintains records of all offenses.

Members of the academic community adhere to principles of academic integrity. You should (1) understand or seek clarification about expectations for academic integrity, including no cheating, plagiarism, and inappropriate collaboration; (2) neither give nor receive unauthorized aid on examinations or other course work that is used as a basis for grading; and (3) take responsibility to monitor academic dishonesty in any form and to report it to the instructor or other appropriate official for action.

Cheating is the actual or attempted practice of fraudulent or deceptive acts for the purpose of improving one's grade or obtaining course credit. Such action includes assisting another student in doing so. Do not cheat! Do not enable anyone else to cheat!

Plagiarism is a specific form of cheating that consists of misuse of the published and/or unpublished works of others by misrepresenting the material as one's own work. Plagiarism is strictly forbidden!

We are intolerant of dishonesty. If a student is caught cheating, we will punish him/her to the fullest extent in accordance with the university academic policy: https://provost.asu.edu/node/20 Penalties for cheating and plagiarism can include a 0 on a particular assignment, failing the course, and expulsion from the university.

CEE 361 Fall 2017 Course Schedule

Notes: H = a homework assignment is due by the end of class. Q = a quiz at the beginning of the lab/discussion period and on th subject matter of the homework assignment having the same number. Lab = dates of laboratory exercises.

Date	Day	Subject	Pages in Mihelcic & Zimmerman
08/17	Th	Introduction to CEE 361; Mass	Inside front and back covers; 37-61
08/18	F	Special Discussion	--
08/22	T	Mass and Mass Balances	37-61; 116-125
8/24	Th (H1)	Mass Balances; Energy	125-139; 140-145
08/25	F (Q0)	Practice Quiz & Discussion	--
08/29	T	Water Properties and Quantities	Inside front cover; 309; 317-322
08/31	Th (H2)	Water Sources and Movement	298-300; 308; 355-360
09/01	F (Q1)	Quiz & Discussion	--
09/05	T	Drinking Water Quality	377-388
09/07	Th (H3)	Drinking Water Quality	400-403
2/05	F (Q2)	Quiz & Discussion (Lab 1a)	--
09/12	T	Drinking Water Quality	385-400
09/14	Th (H4)	Drinking Water Treatment	400-438
09/15	F (Q3)	Quiz & Discussion (Lab 1b)	--
09/19	T	Surface Water Quality	80-81; 213-224; 337-343
09/21	Th (H5)	Surface Water Quality	224-230; 344-349
09/22	F (Q4)	Quiz & Discussion (Lab1c)	--
09/26	T	Surface Water Quality	87-93
09/28	W (H6)	Surface Water Quality	94-100; 231-237; 387
09/29	F (Q5)	Quiz and Discussion (Lab 2a)	--
10/03	T	Wastewater Treatment	442-473; 482-489
10/05	Th (H7)	WW Treatment and Hot Water Topics	475-480; 431-433
10/06	F (Q6)	Quiz and Discussion (Lab 2b)	--
10/10	T	FALL BREAK	--
10/12	Th (no H)	Structure of the Atmosphere	585-589
10/13	F	MID-TERM EXAM	--
10/17	T	Structure of the Atmosphere	585-589
10/19	Th (H8)	Ambient Air Quality	589-602
10/20	F (Q7)	Quiz and Discussion (Lab 2c)	--
10/24	T	Ambient Air Quality	589-602
10/26	Th (H9)	Ambient Air Quality	603-612
10/27	F (Q8)	Quiz & Discussion	--
10/31	T	Ambient Air Quality	618-634
11/02	Th (H10)	CO_2 and Climate Change	32-58; 145-150
11/03	F(Q9)	Quiz and Discussion (Lab 3)	--
11/07	T	CO_2 and Climate Change	32-58; 145-150
11/09	Th (H11)	Stratospheric Ozone Depletion	585-586; 603-607
11/10	F (Q10)	Quiz and Discussion	--
11/14	T	Stratospheric Ozone Depletion	585-586; 603-607
11/16	Th (H12)	Hot Topics in the Atmosphere	--
11/17	F (Q11)	Quiz and Field Trip	--
11/21	T	Solid Waste Management	525-570
11/23	Th	Thanksgiving Holiday	--
11/24	F	Thanksgiving Holiday	--

11/28	T	Solid Waste Management	525-570
11/30	Th	Catch Up and Review, as needed	--
12/01	F (Q12)	Quiz & Field Trip	--
12/06	Th	FINAL EXAM: 12:15 pm – 2:00 pm	--