CE 3342 – Water and Wastewater Engineering – Spring 2017

The University of Texas at El Paso
Department of Civil Engineering
Class: Tues/Thurs 12:00-1:20pm, LART 108
CRN: 28146
Prerequisites: CE 2375 and Junior Standing

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Philosophy

I believe that *teaching* and *learning* are interdependent; you cannot have one without the other. You and I are partners and colleagues, working together to help you become a knowledgeable, curious, intrinsically motivated, and confident engineer. I want to help you become a critical thinker with sharpened skills of analysis, evaluation, and synthesis. I incorporate team-based, hands-on projects in this course to help you prepare for professional practice and to help you develop as a more robust and intrinsically-motivated engineer. I have also realized that it is important to provide weekly homework assignments and quizzes, which help students keep up with understanding and applying concepts. Thus, I have implemented a combination of homework assignments, quizzes, exams, and team projects in this course.

Required Text: Davis (2010) Water and Wastewater Engineering, McGraw Hill

Supplemental Texts: Viessman et al (2009) Water Supply & Pollution Control, 8th Ed., Prentice Hall;
Benjamin and Lawler (2013) Water Quality Engineering: Physical & Chemical Treatment Proc., Wiley;
MWH (2012) Water Treatment: Principles and Design, 3rd Ed., Wiley;
Metcalf &Eddy (2014) Wastewater Engineering: Treatment and Reuse, 5th Ed., , McGraw Hill

Description and Objectives

This course involves a study of theory and preliminary design of basic physical, chemical, and biological processes involved in drinking water and sanitary wastewater treatment systems. The objectives of this course are to develop:

- awareness of the environment in which we, as a society, live and the significance of the local, state, national, and global problems that face the engineering community. (ABET Outcomes H, I, J)
- design background required to solve problems dealing with water quality, water & wastewater treatment, water storage, and water regulation. (A, C, E)
- preliminary design of conventional coagulation, flocculation, sedimentation, and granular media filtration treatment processes. (C, F, L)
- preliminary design of membrane filtration and desalination processes. (C, F, L)
- preliminary design of conventional activated-sludge wastewater treatment processes. (C, F, L)
- the ability to work in teams on complex design problems and become effective written and oral communicators. (C, D, G)
- design knowledge sufficient to pass the water and wastewater problems on the Fundamentals of Engineering (FE) exam and the Professional Engineering (PE) exam. (C, F, K, L)

Expectations

Participation: More than simply attending class, you are invited to *think,* and *participate* in the lectures and discussions. I encourage you to be curious and inquisitive during lectures and discussions.
Preparedness: I recommend that you bring the textbook, a personal course notebook, a pen or pencil, a calculator, completed homework assignments, and questions from the homework and assigned reading.
Punctuality: You are expected to be on time to class, laboratory exercises, and plant tours. Assignments submitted late will be assessed a penalty of 10 points per day.

Ethics: In engineering, personal integrity is of utmost importance, especially in the assessment and reporting of environmental conditions. Also, in most cases, it is necessary to work in teams to develop and design optimal solutions to problems and challenges, and it is essential that each team member contribute to the productivity of the team. In this course, I strongly recommend that you complete homework assignments in teams; in many cases, you will help each other through the solution of difficult problems. My goal for the homework is for you to develop proficiency in the basic application and calculations in design. Thus, every student is accountable for *understanding* the concepts, analysis, and solution. My goal for the projects is for you to have opportunity to apply this theory in a deeper and more meaningful way than homework. Each student is accountable for understanding and *contributing* (equitably) to the team projects. Any student committing plagiarism (*e.g.*, copying another's work without understanding) or any other form of academic dishonesty will be reported to the Dean of Students for disciplinary action (which may include expulsion from the University). For a concise summary of engineering ethics, I have provided here the Fundamental Canons within the Code of Ethics of the American Society of Civil Engineers (ASCE):

1. *Engineers shall hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development3 in the performance of their professional duties.*
2. *Engineers shall perform services only in areas of their competence.*
3. *Engineers shall issue public statements only in an objective and truthful manner.*
4. *Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.*
5. *Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.*
6. *Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of the engineering profession and shall act with zero-tolerance for bribery, fraud, and corruption.*
7. *Engineers shall continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.*

Homework

Some of the homework assignments will be completed through the UTEP Blackboard website (available through https://my.utep.edu/), and some homework assignments will be completed through Quest Learning and Assessment (https://quest.cns.utexas.edu), a web-based content and homework delivery system maintained by The University of Texas at Austin. Please go to https://wikis.utexas.edu/display/questla/Obtaining+a+University+of+Texas+EID for instructions on how to sign up for the Quest system for this class (UTEP, Spring 2017, CE 3342, 28146). During the beginning of this course, when you log into Quest, you will be asked to pay $30 via credit card on a secure payment site (https://getquest.cns.utexas.edu/students/collegiate-subscriptions), which goes toward the maintenance and operation of the resource. Billing for non-UT students begins on Friday, January 27 and closes Monday, February 13.

Team Project

You will be assigned to a team, and your team will choose a project. You may choose to design a surface water treatment plant as a conventional coagulation, flocculation, sedimentation (CFS) process with membrane filtration, or you may choose an alternative project.

Peer Evaluation

Peer evaluations of team members will be facilitated through the Comprehensive Assessment of Team Member Effectiveness (CATME) system. Students will receive an email invitation to log-in online to rate themselves and their teammates using a secure, web-based interface to evaluate based on five dimensions of team-member contributions (Contributing to Work; Interacting with Teammates; Keeping Team on Track; Expecting Quality; and Having Knowledge/Skills). The system allows instructors to view each student's ratings of every team member, which increases students' accountability for their ratings. Students can also make confidential comments in the system, which go only to their instructor. The system flags a number of "exceptional conditions" in the rating patterns to alert instructors to teams or students who might benefit from their attention. The system also allows instructors to release feedback to their students. The feedback shows students their self-rating, the average rating that teammates gave the student, and the team-average

rating for each of the five dimensions of the CATME Peer Evaluation scale. In addition, the feedback suggests behaviors that could improve students' ratings in each of the five dimensions. For more information, please visit http://info.catme.org/.

Course Grade

Assessment of your performance in this course will be determined by homework, quizzes, exams, a team design project, and a peer evaluation. (No makeup exams will be offered.) Handwritten homework calculations must be submitted on engineering paper. The course average will be computed by the following:

Evaluation	Contribution (%)
Homeworks (17)	25
Quizzes	5
Midterm Exams (3)	39
Team Project (Report)	5
Team Peer Eval. (CATME)	6
Final Exam	20
Total	*100*

Graduate students taking this course for graduate credit will be graded by the following:

Evaluation	Contribution (%)
Homeworks (17)	20
Quizzes	5
Midterm Exams (3)	39
Team Project (Report)	5
Team Peer Eval. (CATME)	6
Individual Project	5
Final Exam	20
Total	*100*

Final Grade

A final exam score of at least 50% is required to pass the course. Furthermore, the final course grade will be determined according to the following:

Average (%)	Grade
≥ 90	A
80-89	B
70-79	C
60-69	D
< 60	F

I reserve the right to modify or augment this grading scheme for the sake of improving the educational effectiveness of this course.

Topics Covered

The topics covered in this course are:

1. Water Resources Planning and Management
2. Water Quality Parameters and Regulations
3. Conventional Drinking Water Treatment Processes
4. Advanced Water Treatment Processes
5. Biological Wastewater Treatment Processes
6. Sludge Processing
7. Water Reclamation and Reuse

Special Accommodations

The University of Texas at El Paso provides, upon request, appropriate academic accommodation for students with disabilities. For more information, contact the Center for Accommodations and Support Services (http://sa.utep.edu/cass/).

Tentative Course Schedule

Class	Day	Date	Topics	Reading	Assignment
1	T	JAN 17	Documentary: *Last Call at the Oasis* (2011)		HW 1
2	R	19	Water Resources Planning and Mgmt.	1.1-8, 2.1-2	HW 2
3	T	24	Water Quality and Treatment Processes	2.3-7	HW 2
4	R	26	Coagulation	3.1-4	HW 3
5	T	31	Flocculation and Mixing	3.5-9	HW 4
6	R	FEB 2	Team Project kickoff	-	-
7	T	7	Softening and Redox	4.1-9	HW 5
8	R	9	Sedimentation	7.1-6	HW 6
9	T	14	Granular Media Filtration	8.1-8	HW 7
10	R	16	Disinfection and Fluoridation	10.1-6	HW 8
11	T	21	*Drinking Water Treatment Plant Tour*	*Canal Plant*	-
12	R	23	Microfiltration and Ultrafiltration	9.1-5	HW 9
13	T	28	Ion Exchange	5.1-6	HW 10
14	R	MAR 2	**EXAM 1**	**Chapters 1-4, 7-8**	**HW 1-7**
-	T	7	Nanofiltration and Reverse Osmosis	6.1-6	HW 11
-	R	9	*Desalination Plant Tour*	*Kay Bailey Hutchison Plant*	-
15	T	14	*Spring Break*	-	-
16	R	16	*Spring Break*	-	-
17	T	21	Water Plant Residuals Management	11.1-11	HW 11
18	R	23	Wastewater Collect. and Treatment	12.1-7, 13.1-6	HW 12
19	T	28	Primary Treatment	14.1-6	HW 12
20	R	30	**EXAM 2**	**Chapters 5-6, 9-11**	**HW 8-11**
21	T	APR 4	Microbiology	15.1-9	HW 13
22	R	6	Secondary Trtmnt: attached	17.1-6	HW 14
23	T	11	Secondary Trtmnt: suspended	16.1-9	HW 14
24	R	13	*Wastewater Treatment Plant Tour*	*Hickerson Plant*	-
25	T	18	Second. Settling, Disinfect., and Re-aer.	18.1-5	HW 15
26	R	20	Sludge Thickening, Digest., and Dewater.	20.1-13	HW 16
27	T	25	Tertiary Treat. and Potable Reuse	19.1-5	HW 17
28	R	27	*Tour of Engineering Consultant Office*	*Parkhill, Smith, & Cooper*	-
-	M	MAY 1	Project Final Report Due	-	Project Report
29	T	2	Final Review	-	-
30	R	4	**EXAM 3**	**Chapters 12-20**	**HW 12-17**
31	T	9	**Final Exam, 1:00pm-3:45pm**	**(comprehensive)**	**Exams 1, 2, & 3**