

CENG 4371/CENG 5391 Syllabus

Fall 2025

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Welcome to CENG 4371: Environmental Engineering Design. This course serves as the capstone in a three-part sequence that also includes Hydrology (CENG 3361) and Introduction to Environmental Engineering (CENG 3371). For graduate students, or undergraduates pursuing the Civil Engineering 4+1 program, the course is cross-listed as CENG 5391. Throughout the semester, we will explore the principles and applications of environmental engineering design in ways that are both challenging and rewarding. Class meetings will follow the posted schedule, which also outlines the major topics we will address. A full description of the course objectives is provided at the end of this syllabus.

Course Timing: Tuesday and Thursday 9:30 am to 10:50 am

Location: Ratliff Building South 02019

Office hours: Monday and Wednesday Noon to 1:30 pm

Also, by appointment.

1. If you will miss a scheduled class, you are still responsible for the material
2. You are welcome to seek additional instruction.
3. Course website: UT Tyler's Canvas website.
4. Class Room Procedures:
 - a. I will take random attendance. Participation will be taken based on student's professional activities in class.
 - b. It is a basic principle of professionalism that **"Professionals are not Late."** Please come to class on time and leave on time. Interruption of lecture is not acceptable.
 - c. Bring study notes, textbook, note-taking material, straight edge and calculator TO EVERY CLASS. You may not borrow or exchange calculators during graded events. If your calculator fails during a graded exercise, I am not responsible to furnish a substitute. Class preparation is your individual responsibility. Please refer to the Calculator Policy.
 - d. Textbook: Environmental Engineering Principles and Practice. Richard O. Mines, Jr. Wiley 2014. ISBN 978-1-118-80145. **All students are expected to secure a copy of this textbook or equivalent of Introduction to Environmental Engineering. Content.)**
 - e. There will be handout materials for this course as well.
 - f. Read the chapter assignments before the lecture so that you will be prepared for class discussions. I may have announced and unannounced quizzes over the text assignments if it appears that students are not reading the assigned text materials.
 - g. **Academic Integrity:** In this course, it is important that all work you submit truly reflects your own effort and understanding. Using someone else's work without proper acknowledgment, or relying on unauthorized help during exams, quizzes, or assignments, is considered a violation of academic integrity. To help guide you, the *UT Tyler Student*

Guide on Conduct and Discipline, the current *Undergraduate Catalog*, and the *Manual of Policies and Procedures for Student Affairs (MOPPS, Chapter 8)* provide clear expectations regarding honesty, plagiarism, and cheating. If you are ever unsure about what is acceptable, please ask—being proactive is the best way to avoid mistakes. Maintaining integrity not only upholds university policy but also supports your own learning and success.

5. Exams and Grading:

Course Points

Mid-term Exams (2 at 150 each)	300 (15%)
Homework	400 (20%)
Design Projects X2 (Team Assignment)	600 (30%)
Professional Practice	200 (10%)
Final exam	<u>500 (25%)</u>
Course Total	2000 (100%)

Letter grades will be assigned based on the final course grade:

A	90 and above
B	80 to 89.99
C	70 to 79.99
D	60 to 69.99
F	below 60

You MAY fail this course, if you earn less than 60% on all Exams or if you fail to earn at least 60% on the Final exam, **regardless of your course grade**. Of course, according to UT Tyler grading policies final grades are only A, B, C, D, F and therefore, a C- is a C for a final grade. The distribution provided above is to graphically remind you of how well you are doing and your progress in the course.

- a. **Graduate students** will be required to complete an independent research investigation on a specific Environmental Engineering Topic (not covered by the course) and present their findings to the class as part of their course grade. Additional Graduate Grade Points as follows:
- b. 1000 points broken down as follows
 - 1) 500 points written report
 - 2) 500 points presentation to class
- c. Mid-term Exams and Final Exam:
 - 1) The dates for Hour Exams are included in the course schedule. Official reasons for missing an exam include official University participation, family emergency, or other unforeseen circumstances. See policies for Student Absence in this syllabus, Section 11 and Section 12 below. Regardless of the reason you are required to notify the instructor prior to the exam and as early as feasible. You are required to take a make-up Exam, regardless of your reason for missing the scheduled Exam. Report any conflict to me as soon as possible prior to the Exam.

Calculator Policy

Only NCEES approved calculators will be permitted during tests and your test will be collected and your grade will be a zero if you are using a non-approved calculator.

The approved calculators include the following: (Please check the NCEES website for a complete listing, www.ncees.org/exams/calculator-policy/)

- Hewlett Packard – HP 33s, HP 35s, and no others
- Casio – All FX 115 models
- Texas Instruments – All TI 30X or TI-36X models.
- If you are unsure about your calculator, it is your responsibility to check with the instructor for approval.

2) Register on Canvas because solutions to exams will be posted on Canvas. Other class resources as needed will also be posted to Canvas.

- d. The use of any electronic device (laptop/PDA/Cell Phone/MP3 player/or similar device), during class and exam is prohibited. Your exam will be collected and your grade will be a zero if you are caught using a non-approved electronic device/calculators. The use of phones and MP3 players is not permitted during lectures. The second occurrence of phone use, for any reason, may result in the forfeiture of the device. If you plan to record the lectures for your personal use please notify me.
 - e. Collection of Student Work: Throughout the semester I will collect student work (best, average, and worst) for the ABET course or program outcomes notebooks. This will require me to make a copy of your work, keep your original, and return a copy of the graded work to you. I will not draw attention as to what level of work you accomplished.
 - f. Embedded indicators of accomplishment of program outcomes: At times throughout the semester, portions of student work will be analyzed to determine if our program is accomplishing stated program outcomes based on established metrics. If your work is below the minimum established metric, you may be required to repeat the assignment or that portion of the assignment until you achieve the minimum acceptable standard based on the metric.
- 6. Homework assignments and projects:** The purpose of homework assignments and projects is to help reinforce what was taught in class. It helps to prepare students for exams and tests, including statewide exams. Completing homework assignments and projects makes students more responsible and helps them learn time management skills. It gives students another chance to review class material.

Homework assignments and design projects will be assigned on a weekly to semesterly basis. Students may *discuss* their homework solutions with one another, but each student must do his/her own, **independent** assignments (i.e. you may not just copy someone else's homework). If you receive assistance from a fellow student on a particular problem, you must cite that assistance within your solution. The homework due date is marked on the assignment. Homework is due *before* class starts. Assignments turned in after class starts **will be considered late and will not be accepted**. Homework turned in late with a coordinated late, but within one day of the due date, will receive a 25 percent reduction; homework turned in within two days of the due date will receive a 50 percent reduction; homework turned in within

three days of the due date will receive a 75 percent reduction. *No credit will be given for homework turned in more than three days late* or after the solution has been published on the course Canvas.

FORMAT: The production of a neat, organized, high-quality homework assignment and project cannot be overestimated nor can its importance to your course grade be overstated. A homework should be something you are proud of and not something hastily “slapped together”. Toward this end, considerable emphasis will be placed on not only getting the correct answer but also on how the solution is presented.

AI Policy: AI can be used for help, but using AI to do 100%

All homework is mandatory, including problem sets. As an engineer your goal is to make a clear, logical, and professional presentation of your work. As such both your presentation and the accuracy of your work is important, and both will be graded. It is critical that you show all of your work and leave “foot prints” so that it can be easily followed. No guess work should be required to see what you did. All submissions are due at the beginning of class on the due date. Submissions may be handed in to the instructor prior to the start of class.

- 1) Use Engineer paper only with solutions placed in the logical flow of the problem printed on engineering paper; one side only. Clearly present a brief problem statement or a sketch with your solution. Clearly and concisely explain each step. For narratives of more than a line or two, use your word processor or the text capability if you are using MathCAD or Excel. If you are writing out a paragraph or more, you must type it in a word processing package (for projects).
- 2) Late Submissions. It is a basic principle of professionalism that **“Professionals are not Late”**. A “COORDINATED LATE” submission occurs when you will miss the deadline for a graded homework assignment, and you contact me in advance. Notification immediately before the submission will not suffice. Deductions to your assignment grade for late submissions will be given.
- 3) All homework in this course must be properly documented. As you are having your work reviewed it is likely that you might receive help from your classmates, just simply document it. Information from the course textbooks (equations and outlines of procedures), class notes, or me are considered immediately available to all students and need not be acknowledged or documented. **YOU ARE REQUIRED TO ACKNOWLEDGE AND DOCUMENT ALL OTHER ASSISTANCE AND REFERENCES USED.** Documentation will be accomplished in accordance with any manual for writing, footnote or endnote, for papers, but for written homework, just place the documentation right at the point you received help describing who and what assistance.

Assigned readings. Doing the assigned reading prior to class will help you to understand the material presented during the instruction and will fill in gaps for things we do not cover (***I will not cover everything***). It will also make you more familiar with terms and concepts to be covered. To help motivate you to do the reading there may be unannounced quizzes that cover the assigned sections of the text.

Obviously, there are circumstances that will occur and make a timely submission impossible and I will work with you when those circumstances legitimately occur.

7. Students Rights and Responsibilities. To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link:
<http://www.uttyler.edu/wellness/StudentRightsandResponsibilities.html>
8. Grade Replacement/Forgiveness. If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to do so will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates will receive grade forgiveness (grade replacement) for only three course repeats; graduates, for two course repeats during his/her career at UT Tyler.
9. State-Mandated Course Drop Policy. Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the 12th day of class (See Schedule of Classes for the specific date). Exceptions to the 6-drop rule include, but are not limited to, the following: totally withdrawing from the university; being administratively dropped from a course; dropping a course for a personal emergency; dropping a course for documented change of work schedule; or dropping a course for active duty service with the U.S. armed forces or Texas National Guard. Petitions for exemptions must be submitted to the Registrar's Office and must be accompanied by documentation of the extenuating circumstance. Please contact the Registrar's Office if you have any questions.
10. Disability Services. In accordance with federal law, a student requesting accommodation must provide documentation of his/her disability to the Disability Support Services counselor. If you have a disability, including a learning disability, for which you request an accommodation, please contact Ida MacDonald in the Disability Support Services office in UC 282, or call (903) 566-7079. Additional information may also be obtained at the following UT Tyler Web address:
<http://www.uttyler.edu/disabilityservices>
11. Student Absence due to Religious Observance. Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.
12. Student Absence for University-Sponsored Events and Activities. If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.
13. Social Security and FERPA Statement. It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.
14. Emergency Exits and Evacuation. Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do Not re-enter the building

unless given permission by University Police, Fire department, or Fire Prevention Services.

UT Tyler Honor Code

Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link:<http://www.uttyler.edu/wellness/rightsresponsibilities.php>

Campus Carry

We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.uttyler.edu/about/campus-carry/index.php>

UT Tyler a Tobacco-Free University

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, waterpipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit www.uttyler.edu/tobacco-free.

Recording of Class Sessions

Class sessions may be recorded by the instructor for use by students enrolled in this course. Recordings that contain personally identifiable information or other information subject to FERPA shall not be shared with individuals not enrolled in this course unless appropriate consent is obtained from all relevant students. Class recordings are reserved only for the use of students enrolled in the course and only for educational purposes. Course recordings should not be shared outside of the course in any form without express permission.

Laptops/PDAs/MP3 players/Cell Phones or other electronic devices

- The use of any electronic device, except an approved calculator, is not permitted during exams. Your exam will be collected and your grade will be a zero if you are caught using a non-approved electronic device/calculators. Any instances of a calculator inappropriately used during an exam will be the basis of alleging Academic Misconduct and may result in Failing (F) of the course at the determination of the course's instructor or the basis for a recommendation for expulsion from the University. Any Calculator used during an exam in this course must meet the requirements stated within the policy below.
- **Calculator Policy**

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The approved calculators include the following: (Please check the NCEES website for a complete listing, www.ncees.org/exams/calculator-policy/. Examples include but are not limited to:

- Hewlett Packard – HP 33s, HP 35s, and no others
- Casio – All FX 115 models
- Texas Instruments – All TI 30X or TI-36X models.
- If you are unsure about your calculator, it is your responsibility to check with the instructor for approval.

At the discretion of the course instructor, any calculator not meeting the requirements stated (especially in the case of a graphing calculator) may be used but only after an inspection of the device and a clearing of all the memory within the device, performed for the instructor at a time immediately prior to the exam. At any time during the exam your calculator is subject to a random search by the instructor. Failure or refusal to clear all memory or to surrender your calculator to search will disqualify you from the exam immediately, unless you can produce a calculator meeting the requirements as stated above.

COURSE OUTLINE and SCHEDULE

Topics Covered

<u>SUBJECTS</u>	<u>LESSONS</u>
Course Introduction	1
Review of Basics for Environmental Engineering	2
Design and construction process	1
Hydraulics and design of distribution and collection systems	4
Design of water treatment plants	6
Design of wastewater treatment plant	4
Design of Stormwater Control Devices	2
Treatment residuals management	2
Open Design Topics (To be determined)	2
Exam Reviews	1
Student design presentations	2
<u>Exams (includes final)</u>	<u>3</u>
Total Lessons	30

Course Schedule

	Lsn #	Special	DATE	Material covered	Readings		
	1		26-Aug	Course intro and syllabus distribution/ Review	Syllabus		
	2		28- Aug	Design and Construction Considerations	Handout		
	3		1-Sep	Review of Environmental Basics 1	Handout		
	4	4-Sep Census Day	2-Sep	Review of Environmental Basics 2, (Alkalinity, Coagulation, Softening)	Ch. 6.3 Ch 4.8.3 Handout		
	5	Census 9/11	4-Sep	Water demand Human population growth	Handout		
	6		9-Sep	Intake structures			
	7		11-Sep	Design of Water treatment systems Flocculation and Mixing Softening Basins	Ch. 6.5C & 6.6		
	8		16-Sep	Sedimentation	Ch. 6.7		
	9		18-Sep	Filtration	Ch. 6.8		
	10		23-Sep	Disinfection	Ch. 6.11		
	11		25-Sep	Other Technologies	Ch. 6.9-6.10		
			30- sep	Distribution Considerations	Handout		
	12		2-Oct	Exam 1			
	13		7 Oct	Design of water distribution systems	Handout		
	14		9-Oct	Design of water distribution systems	Handout		
	15		14-Oct	Design of water distribution systems	Handout		
	16		16-Oct	Design of Wastewater collection systems	Handout		
	17		21-Oct	Design of Wastewater collection systems	Handout		
	18		23-Oct	Design of Wastewater collection systems	Handout		
	19		28-Oct	Design of Wastewater treatment systems Preliminary treatment	Ch.7.2 Ch. 7.3		
			30-Oct	Primary treatment	Ch. 7.4		
	21		4-Nov	Secondary treatment	Ch. 7.5		
	22		6- Nov	EXAM II			
	23		11 Nov	Advanced treatment	Ch. 7.8		
	24		13 Nov	Water/Wastewater Residuals (Solid Waste)	Ch. 7.11		
			17-22	Stormwater Design Final Review			
			24-28 Nov	Thanksgiving Break			
	27		8-13 Dec	Final Exam			

Unless otherwise indicated readings are found in the textbook

Course Objectives:

1. Apply basic principles of environmental engineering in a design of a water treatment plant and distribution system
2. Apply basic principles of environmental engineering in a design of a waste water treatment plant and collection system
3. Apply basic principles of environmental engineering in storm water controls.
4. Analyze the performance of designed environmental engineering processes
5. Evaluate system performance to regulatory limits for water quality and discharge
6. Modify existing environmental system to address new or changed pollutant demands.
7. Recognize and specify environmental contaminant concentrations to certain human health concerns.
8. Distinguish between the adequacy of designs of environmental control systems