

1. Course number and name

CENG 4371-CENG 5391, Environmental Engineering Design

2. Credits, contact hours

- a. 3.0 Credit Hours
- b. Three hours of lecture per week
- c. This is an engineering topics course designed to build upon the fundamentals of environmental engineering and develop students' skills in designing systems to prevent, control, and mitigate various forms of environmental pollution.

3. Instructor's or course coordinator's names

Dr. Zain Al Houry and Dr. Mrityika Rodela

4. Textbook, title, author, and year

Introduction to Environmental Engineering. Mackenzie Davis and David Cornwell, McGraw Hill 2023. ISBN10: 1264563876, ISBN13: 9781264563876.

Environmental Engineering Principles and Practice. Richard O. Mines, Jr. Wiley 2014. ISBN: 978-1-118-80145.

5. Specific course information

- a. Introduction to environmental engineering design to include techniques to address radiological hazards, human health protection, and limit the impact of traditional pollutants in the aquatic environments and releases into the atmosphere. Design of solid-waste management systems, basic air pollution control systems, and basic water and wastewater treatment systems.
- b. CENG 3371
- c. Elective Course

6. Specific course learning objectives

1. Understand sustainability concepts and key measures (HDI, population models, ecological footprint).
2. Apply environmental engineering and fluid mechanics principles to water treatment system design and analysis.
3. Apply environmental engineering and fluid mechanics principles to wastewater treatment system design and analysis.
4. Analyze and evaluate the performance of water distribution systems using modeling tools such as EPANET.
5. Apply environmental engineering, hydraulics, and hydrology principles in sewer and storm drainage system design.
6. Work collaboratively to develop hydraulic models of water distribution networks and pump stations using EPANET and effectively communicate engineering results.

7. Topics covered

- Introduction to Environmental Engineering
- Materials and Energy Balances
- Basic Sciences (Chemistry/Biology) Primer
- Hydrology
- Storm Water Pollution

- Storm Water Management
- Water Treatment
- Water Quality Management
- Water distribution systems
- Wastewater Treatment and Design
- Water System/Treatment Design

8. Student Learning Outcomes

At the completion of the program, students should be able to	
SO 1	Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
SO 2	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
SO 3	Communicate effectively with a range of audiences
SO 4	Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
SO 5	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
SO 6	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
SO 7	Acquire and apply new knowledge as needed, using appropriate learning strategies

9. Mapping Course to Student Learning Outcomes

The learning objectives of this course contribute to meeting one or more of the student learning outcomes as shown below, with the contribution designated as “H-high”, “M-medium”, or “L-low”:							
	SO1	SO2	SO3	SO4	SO5	SO6	SO7
CLO 1	M	M		H			
CLO 2	H	H	M	M		M	
CLO 3	H	H	M	M		M	
CLO 4	H	M				H	M
CLO 5	H	H		M		M	
CLO 6	H	H	H	M	H	M	M

TENTATIVE COURSE SCHEDULE

The following schedule may be adjusted, as needed, during the semester to better serve the educational needs of the class.

COURSE SCHEDULE (SUBJECT TO REVISION)			
Week	Date	Topic	Assignment
WK 1	25-Aug	Course intro and syllabus distribution/ Review	Syllabus Quiz/Class Discussion
	27-Aug	Sustainability, Engineering and Design- Populations and Consumption	
WK 2	01-Sep	Water demand, Human population growth	Assignment #1
	03-Sep	Water demand, Human population growth	
WK 3	08-Sep	Fire Protection, Fire Flow	Assignment #2
	10-Sep	Temporal Variation in Water Demand	
WK 4	15-Sep	Inlet Structures	Assignment #3
	17-Sep	Design of Engineered System for Water Treatment: Introduction, Screening	
WK 5	22-Sep	Design of Engineered System for Water Treatment: Coagulation and Flocculation	Assignment #4
	24-Sep	Design of Engineered System for Water Treatment: Coagulation and Flocculation	
WK 6	29-Sep	Design of Engineered System for Water Treatment: Sedimentation	---
	01-Oct	EXAM I	
WK 7	06-Oct	Design of Engineered System for Water Treatment: Filtration	Assignment #5
	08-Oct	Design of Engineered System for Water Treatment: Disinfection	
WK 8	13-Oct	Water Distribution Systems: Methods of distributing water, distribution system components	Assignment #6
	15-Oct	Water Distribution Systems: Capacity and pressure requirements	
WK 9	20-Oct	Analysis of Water Distribution System: EPANET Modeling	Assignment #7
	22-Oct	Analysis of Water Distribution System: EPANET Modeling	
WK 10	27-Oct	Types of Collection Systems, Types of Sewers, Basic Considerations in the design of Sewers	Assignment #8
	29-Oct	Design of Stormwater Sewers	
WK 11	3-Nov	Design of Stormwater Sewers	---
	5-Nov	EXAM II	
WK 12	10-Nov	Storm sewers and Detention	Assignment #9
	12-Nov	Identify the sources of Sewage, estimate the quantity of wastewater	
WK 13	17-Nov	Design of Sanitary Sewers "Collection Systems"	Design Project Due Date
	19-Nov	Engineered System for Wastewater Treatment and Disposal: Wastewater Characteristics and Treatment Schemes.	
WK 14	24-Nov	THANKSGIVING BREAK (11/24 - 11/28)	
	26-Nov		
WK 15	1-Dec	Design Project Presentation	Professional Practice
	3-Dec	Design Project Presentation	
WK 16		FINAL EXAM (12/07- 12/11)	

CENG 4371, 5391-031 Environmental Engineering Design Course Policies & Student Responsibilities

Lecture Time & Venue

Meeting Time(s): Our course is scheduled from 09:30 AM-11:00 AM on T/Th

Course Number and Section: CENG 4371,5391- Section 031 (HEC Campus)

Classroom Number(s): Room HEC 0A217

Students are expected to attend class and take their own notes during lectures. If a class is missed, students are still responsible for all material covered. Presentation slides will be posted in the appropriate section of the CANVAS modules, but they are intended to support—not replace—your personal notes.

Instructor Information

Instructor Name: Dr. Zain Al-Houri

Office Number: HEC A211

Email: zalhouri@uttyler.edu

Office Hours (In Person):

M/W 11:15 AM – 12:15 PM,

T/Th 11:15 AM – 12:15 PM or

by appointment (BEST PRACTICE is to email me ahead of time to set up an appointment for when you would like to meet.

Course Description

Welcome to CENG 4371(CENG 5391) (Environmental Engineering Design). This course is the final course in a three-course series focused on water resources and environmental engineering, following Hydrology (CENG 3361) and Introduction to Environmental Engineering (CENG 3371). It is also cross listed as CENG 5391 for graduate students or those pursuing the CE program's 4+1-degree path. This semester, you'll find our exploration of Environmental Engineering Design both engaging and challenging. We will delve into topics such environmental engineering design of unit operations and unit processes for water and wastewater treatment, environmental engineering hydraulic design including water distribution systems, wastewater collection, water and wastewater pumping, and special topics such as Green Engineering and Green Chemistry in practice, designing for process and system sustainability.

Contact

All course-related communication with the instructor must be sent through the Canvas Inbox rather than your regular UT Tyler Patriot email account. Your Patriot email should be used to contact me only if Canvas is unavailable or inaccessible. I will respond to messages as soon as possible; however, please allow **up to 24 hours** for a response.

Course Website

Canvas will be used to manage the course material for the semester. All course materials and announcements will be provided in Canvas. There you will find homework assignments, homework solutions, handouts, and other materials for the class. **Please check there regularly.**

Sharing of course materials: Course materials delivered via Canvas may NOT be shared online or with anyone outside of the class without me granting express written permission. The term handouts refers to all materials generated for this class, which include but are not limited to the syllabus, quizzes, exams, assignment sheets, recorded lectures, outlines, in-class materials, and review sheets. The unauthorized sharing of class materials outside of the class constitutes academic dishonesty, and disciplinary action may be taken (see Policy on Academic Dishonesty below).

Grading and Assessment

The following components contribute to your final grade* :

I. CENG 4371

Assessment Component	Weight	Final Grade: Scale
Homework	10 %	
Professional Practice	5 %	
In-Class Activities/ Quizzes	10 %	90-100: A
Design Project (Team Assignment)	15 %	80-89: B
Midterm Exams (2)	40 %	70-79: C
Final Exam	20 %	60-69: D
	100%	<60: F

II. CENG 5391**

Assessment Component	Weight
Homework	10 %
Professional Practice	5 %
In-Class Activities/ Quizzes	10 %
Design Project (Team Assignment)	15 %
Research Paper	35%
Midterm Exams (2)	40 %
Final Exam	20 %
	135%

* There will be no makeup work or extra credit allowed/granted at the end of or during the semester unless allowed/granted to everyone by the instructor. All assignments must be submitted at the designated time to receive credit.

** The total points earned will be normalized to a 100-point scale, and the resulting percentage will be used to determine the final letter grade according to the departmental grading scale shown above.

Graded Course Requirements Information

Midterm Exams and Final Exam

- The exams are TENTATIVELY scheduled for:
 - Exam 1: Th, Oct 01st
 - Exam 2: Th, Nov 05th
 - Final Exam: As published by the University.
- Exams dates may be moved up or pushed back depending on the progress of the lectures.
- Exams Format: The purpose of the examinations is to assess your command of the material we've covered in a particular unit. Each exam will contain conceptual questions (MC, T/F, and short answer questions), as well as numerical questions. We'll take some time in the week before an exam to talk about study strategies, and I'll be happy to answer any review questions you may have, but bear in mind that the best way to prepare for these exams is to keep up with the readings and our in-class activities.
- The mid-term exams and final exam are closed-book. You can use a TI-30 calculator (or FE equivalent, see calculator policy below), and instructor-approved reference material.
- Use the restroom prior to coming to class to take an exam. Suspicious restroom breaks in the middle of an exam are not acceptable.
- I do not give exam back, and exam solutions will NOT be posted on Canvas. However, you are welcome to visit the office to review the solutions in person. Please note that taking photos of your exam paper with your phone is not permitted.
- All exams will be held in person during class time. The final exam will also be held in person at the time, date and location specified by the university.
- Additional information will be provided in class

Homework Assignments

- Homework will be assigned on a regular basis (see homework schedule).
- You must upload your homework to Canvas as a single PDF file no later than 11:59 p.m. on the due date. Images or photos that are unclear, incomplete, or do not show the entire A4 page will not be accepted.
- No late homework will be accepted except for unusual circumstances.
- Solutions should be presented in a clear methodical manner. Follow the “homework submission guidelines” when completing your assignment. Solutions which are not clearly presented will receive a 0 credit.
- Students may discuss their homework solutions with one another, but each student must submit their own, independent solutions (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.

Homework Submission Guidelines

- Homework assignments must be completed on engineering paper. Homework solutions not submitted on engineering paper will receive only 90% of the graded credit.
- The header of the first page should include the following:
 - Name of Student: LAST NAME, FIRST NAME (All Caps)
 - Course Number and Name
 - Homework Number
- There should be no more than 2 problems per page. This is to ensure that there is enough space on the paper for the grader to add comments.
- All problems should include:
 - Problem Number
 - A diagram of the problem
 - A set of given quantities
 - A set of unknown quantities
 - A set of assumptions
- All numbers and writing should be clear and readable.
- When required to produce a graph, use a computer program such as Excel or MATLAB to generate the plot. Do not draw it by hand!
- Points will be deducted for submissions that do not meet these requirements.

Late Homework/ Assignment Policy

- It is a basic principle of professionalism that “Professionals are not late.”
- A “COORDINATED LATE” submission occurs when you miss the deadline for a graded homework assignment, and you contact me in advance. Notification immediately before the submission will not suffice.
- Point cuts up to the amounts below may be assessed for a “COORDINATED LATE” submission:
 - 0-24 hours late, a deduction of 25% of the earned grade
 - 24-48 hours late, a deduction of 50% of the earned grade
 - More than 48 hours late. No credit.

AI Use and Citation Policy for Homework

- If you use a generative AI tool (such as ChatGPT) to assist with a homework assignment, you must clearly indicate this in your submission. Your acknowledgment should include the AI tool used (e.g., ChatGPT by OpenAI), the date accessed, and a brief description of how the tool was used (e.g., checking an answer, explaining a concept, or assisting with problem solving). Failure to properly acknowledge the use of AI assistance will be treated as academic dishonesty.
- *Example Citation:*

The solution to this problem is generated with the assistance of ChatGPT (OpenAI), accessed on [date], to help brainstorm solution steps. The final work was reviewed, revised, and completed by the student.

Quizzes

The instructor may give unannounced or announced in-class quizzes throughout the semester. These quizzes will cover material covered in previous lectures.

In-Class Activities

Active class participation is an essential component of this course. In-class activities and exercises are designed to reinforce key concepts, develop problem-solving skills, and encourage collaboration among peers. These activities may include, but are not limited to:

- Solving example problems related to lecture topics.
- Engaging in group discussions or case studies.
- Completing short individual or team-based assignments.
- Participating in real-time quizzes or polls to assess understanding.

Regular participation will help build skills essential for success in this course.

Professional Practice Assignment

- Your professional practice grade will be based on your attendance at 3 ASCE student technical meetings (cookout and game night events do not count) throughout the fall semester. Examples of valid meetings include guest speakers, field trips, or any other technical meeting from either organization within the College of Engineering.
- For each professional practice meeting, you must take a picture as proof of attendance, ensuring you are visible in the picture. Be sure to include the speaker's name and a summary of what you learned during the meeting.
- You should use a template Word file when you attend professional practice meetings, and you must complete this for each meeting you attend.
- Refer to the class schedule and the course Canvas page for the submission due date.

Final Project

Submission Guidelines: Students, in groups (3 students), will be required to complete a final design project. Students are required to select their own group. Each group is expected to complete the project work and prepare a professional report (i.e., cover letter + brief technical report + appendices+ support conclusions or recommendations with model results or observations).

Refer to the class schedule and course page for project submission due dates.

RESEARCH PAPER (Requirement for Graduate Course Only)

As part of the co-enrollment requirement for this course, graduate students will be required to complete an independent research investigation on a specific Environmental Engineering Topic (not covered by the course), submit a research paper, and present the findings to the class as part of their course grade. Additional 1000 points Graduate Grade Points are broken down as follows:

- 20 points written research paper (Analytical, experimental, review, survey, case study, etc.)
- 10 points presentation to class includes appropriate presentation slides
- 5 points to produce a FAQ document associated with your selected topic and distributed to the class members (and posted to CANVAS) at the time of your presentation

Refer to the class schedule and course page for the guidance, format for deliverable on this section of grading, and submission due date.

Regrade Requests

- If you have questions or concerns about your grades, you must discuss them with me within 15 days after the grades are posted. Students in the Houston section may attend my office hours, while students in the Tyler section should schedule a virtual meeting. You are responsible for checking your grades regularly on Canvas to monitor your progress in the course. If you have questions or concerns about your grades, you must discuss them with me within 15 days after the grades are posted. Students in the Houston section may attend my office hours, while students in the Tyler section should schedule a virtual meeting. You are responsible for checking your grades regularly on Canvas to monitor your progress in the course.

Late Work and Make-Up Exams

- There will be no makeup work or extra credit allowed/granted at the end of or during the semester unless allowed/granted to everyone by the instructor. All assignments must be turned in at the appropriate time to receive credit.
- Failure to take the exam at the scheduled time will constitute a grade of zero in the exam.
- Official reasons for missing an exam are outlined in the UT Student Handbook. Report any conflict to me as soon as possible prior to the Exam. You are required to take a make-up Exam, regardless of your reason for missing the scheduled Exam.

Attendance Policy/Classroom Procedures

- Attendance will be taken in every class, and your presence is essential, as much of your grade will depend on what we accomplish during class meetings. I understand that emergencies or unexpected situations may occasionally prevent you from attending. If this happens, please notify me as soon as possible so we can make arrangements to help you catch up. However, this does not apply to non-emergencies, such as oversleeping. For absences due to university-sponsored activities, please coordinate with me in advance to address any missed work.
- Bring study notes, textbook, note-taking material, 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 for furnishing a substitute. Class preparation is your individual responsibility. Please refer to the Calculator Policy.
- You will need regular access to a computer with an Internet connection to be able to participate in some of the in-class activities during the period of this semester.
- I will take attendance in every class. Non-attendance may adversely affect your grade. If your absence from class becomes excessive, you may be asked by the instructor to withdraw from the class.
- It is a basic principle of professionalism that “Professionals are not Late.” Please come to class on time and leave on time. Interruption of the lecture is not acceptable. Normally, an excuse would be given for being late or missing that class if you have a valid, verified urgent emergency or some validated significant act of nature or God, like a car accident.
- **No food or snacks in classrooms.**
- Phones ringing or vibrating are distracting during class or if you are texting during class, you will relinquish your device for the duration of the class. A second offense will result in a request for you to leave the classroom.

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/. 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.

Communication & Support

- Students are expected to display proper netiquette (Internet etiquette) with their instructor and with other students. This includes being polite, stating your needs clearly and politely. Practice collegiality and mutual respect. If an email or discussion post ever concerns you, please notify me privately and we'll work toward a resolution.
- In general, the most efficient way to communicate and to get the help you need with your questions and/or concerns is during office hours. If you are unable to meet during my office hours, you may contact me through the Canvas Inbox to schedule a time that works for you. Please maintain a professional tone in all written communications. Follow the guidelines below when preparing your correspondence:

• Include a subject Line • Add "[Course Prefix and #]" • Use a greeting • Sign the end of your email with your name and a thank you • State your needs clearly and politely!		• Demand help • Be ambiguous with your need • Use slang or inappropriate language • Email past 7 pm and expect an answer before school in the next day • Send an email and never check for a response!	
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Final Day to Withdraw

The final day to withdraw from the course without penalty is **Sep 16th**.

The last day to withdraw from the course is **Oct 30**.

Census Dates

The university requires that instructors report attendance to the register at various points in the semester. Therefore, on **September 8th**, I will report the attendance for the class.

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.

Chat GPT or other AI sources

Students may use AI-based writing programs only for homework assignments, and any AI-generated content must be properly cited or referenced. The use of AI tools on exams or quizzes is strictly prohibited. Unauthorized use will be considered cheating according to the Academic Dishonesty policy below.

Academic Misconduct

Plagiarism of homework and cheating on examinations will be interpreted as academic misconduct and will not be tolerated. Please refer to the University of Texas at Tyler's current Undergraduate Catalog for academic policies and Manual of Policies and Procedures for Student Affairs (MOPPS, Chapter 8) regarding academic integrity, cheating and plagiarism. Academic dishonesty will not be tolerated. Ignorance of the rules and policies provides no protection from the consequences.

Technical Support

For technical problems with Canvas, contact UT Tyler 24/7 Canvas Support, which can be accessed by clicking Help at the bottom of the Global Navigation menu on the far-left side of the browser window. For login/password problems or support for other technical issues, contact Campus Computing Services at 903-565-5555 or itsupport@uttyler.edu.

University Policies & Student Resources:

University policies and student resources are available on the University website and in the Course home page on Canvas:

- [University Policy](#)
- [Student Resources](#)

Artificial Intelligence Statement

UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy. Refer to the About This Course section of the UT Tyler Syllabus Module for specific information on appropriate use of AI in your course(s).