

1. Course number and name

CENG 3361, Applied Engineering Hydrology and Hydraulic Design

2. Credits, contact hours, and categorization of credits in Table 5.1 (math and basic science, engineering topic, and/or other)

- a) 3.0 Credit Hours (ES=2.5, ED=0.5)
- b) Two hours of lecture and three hours of laboratory per week
- c) This is an engineering topics course in Hydrology and Hydraulics engineering that focuses on the hydrologic cycle and the design of hydraulic structures to meet those needs. It provides the background for follow-on courses in water resources as well as environmental design.

3. Instructor's or course coordinator's names

Dr. Zain Al Houry

4. Textbook, title, author, and year

Hydrology and Hydraulic Systems, 4th edition. Ram Gupta; Waveland Press, Inc. ISBN 1-4786-3091-4.

5. Specific course information

- a) Concepts covered are hydrologic cycle, precipitation, evapotranspiration, infiltration, runoff, hydrograph analysis, open channel flow, design of stable channels, and hydraulic design of weirs, spillways, stilling basins, and culverts. A design project involving hydrologic system analysis and design is assigned.
- b) CENG 3310 or MENG 3310
- c) Required course

6. Specific goals for the course

The course director's assessment of how this course contributes to the civil engineering program outcomes is listed below. The following scale is used:

1=No Contribution; 2=Small Contribution; 3=Average Contribution; 4=Large Contribution; 5=Very Large Contribution

CIVIL ENGINEERING PROGRAM OUTCOMES	Course Director Assessment
Program Outcomes: Students who qualify for graduation with a civil engineering major will demonstrate:	
1a: Can apply knowledge of traditional mathematics to solve problems	4
1b: Can apply knowledge of traditional science (calculus-based physics, Chemistry, additional science) to solve problems	3
1c: Can apply knowledge of traditional engineering skills to solve problems	5
2: Can design and conduct experiments as well as analyze and interpret data	4
3a: Can design systems, components and processes	4
4: Can work independently as well as part of a team	4
5a: Can identify, formulate, and solve engineering design problems using engineering models in the discipline of structural engineering	1
5b: Can identify, formulate, and solve engineering design problems using engineering models in the discipline of transportation engineering	1
5c: Can identify, formulate, and solve engineering design problems using engineering models in the discipline of construction management	1
5d: Can identify, formulate, and solve engineering design problems using engineering models in the discipline of hydrology and hydraulic design	5
5e: Can identify, formulate, and solve engineering design problems using engineering models in the discipline of environmental engineering	3
5f: Can identify, formulate, and solve engineering design problems using engineering models in the discipline of geotechnical engineering	2
6a: Can analyze a situation and make appropriate professional decisions	3
6b: Can analyze a situation and make appropriate ethical decisions	1
7: Have effective oral, written, and graphical communication skills	4
8a: Demonstrate a commitment to learning and continued professional development outside the classroom	3
8c: Determine the impact of engineering solutions in a global and societal context	2
9a: Can explain professional practice issues	3
9b: Can explain leadership principles and attitudes	1
9c: Can explain management concepts and processes	1
9d: Can explain concepts of business practices	1
9e: Can explain public policy and public administration	1

7. Topics covered

- Engineering Hydrology: hydrologic cycle, precipitation, evapotranspiration, infiltration, runoff
- Hydrographs and Unit Hydrographs
- Frequency Analysis
- Design Storms
- Open Channel Flow
- Hydraulic Design: open channels, weirs, spillways, stilling basins, culverts.

Lecture Time & Venue:

- **Meeting Time(s):** from 01:25 PM-2:20 PM on M/W
- **Course Number and Section:** CENG 3361, Section 051 (HEC Campus) and 050 (Tyler Campus)
- **Classroom Number(s):** Room HECO217 or RBS02019.
- **Join Zoom Meeting**
<https://uttyler.zoom.us/j/82451631315?pwd=YuF73hj4jMTZM7hxz6RiblmVE3sBUf.1>
Meeting ID: 824 5163 1315
Passcode: 430654
- There will be NO recording of the ZOOM so your attendance will be required in the synchronous meeting times. See Attendance below.
- If you miss a scheduled class, you're still responsible for the material. The presentation slides will be available in the corresponding content section within the listed modules on CANVAS, labeled accordingly.

Instructor Information

- Instructor Name: Dr. Zain Al-Houri
- Office Number: HEC A211
- Email: zalhouri@uttyler.edu
- Office Hours (In Person or virtual*): M/W 11:00 AM – 12:00 PM, T/Th 11:00 AM – 12:00 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.
- Virtual office hour-Zoom Link
<https://uttyler.zoom.us/j/83673530678?pwd=Uihnqh61sYUEjWSJi8Zrs2AYKQpW4T.1>
Meeting ID: 836 7353 0678
Passcode: 387259

Course Overview

Welcome to CENG 3361 (Applied Engineering Hydrology and Hydraulic Design). This course introduces two broad fields in water resources engineering: hydrology (surface and subsurface hydrology), and hydraulics of closed conduit and open channel flow. You will first learn the concepts of hydrology, hydrologic processes including precipitation, evapotranspiration, infiltration, runoff, and hydrograph analysis. You will then go through hydraulics and flow in open and closed channels. Lastly, you will be introduced to the principles of design criteria for solving problems related to the design of stable open channels, and storm management systems. A project involving hydrologic system analysis and design will be assigned. During the upcoming semester, I believe you will find our study of hydrology and hydraulic design to be interesting, challenging, and rewarding.

Learning Objectives

- Describe the hydrologic cycle and recognize the various storage and transport pathways in the cycle.
- Predict runoff from a storm using constant (Φ index) loss and (SCS-CN) loss methods.
- Predict runoff from a storm using unit hydrograph methods.
- Apply flood frequency analysis and use probability concepts and frequency distributions to evaluate flood data.
- Describe the hydrologic design scale, select a design storm, and specify precipitation depth and distribution.

- Compute normal depth in a channel.
- Design an open channel.
- Analyze open channel structures such as weirs and spillways.
- Use the Rational Method to compute the peak discharge for an urbanized watershed.
- Use spreadsheets and math solving problems as a tool to perform the mathematical operations required in hydrological and hydraulic analysis and design.
- Perform engineering tasks in a team environment and communicate effectively with others.

Required Textbooks and Readings

- **Primary Textbook:** Hydrology and Hydraulic Systems, 4th Edition by Ram Gupta, Waveland Press, Inc. ISBN 1-4786-3091-4 (the one in which I reference in class).
- **Additional Readings:** Throughout the semester, you will encounter insightful readings assigned and posted on Canvas.

Course Structure

This course is designed to provide a comprehensive understanding of environmental engineering principles through a combination of lectures and hands-on laboratory work.

- Lectures:
 - Frequency: Two lectures per week
 - Duration: 55 minutes
- Laboratory Sessions:
 - Frequency: One lab session per week
 - Duration: 3 hours per session
- UT Tyler’s Canvas website will be used to manage the course material for the semester. There you will find homework assignments, homework solutions, handouts and other material pertaining to the class. **Please check there regularly.**

Grading Structure

Assignment	Percentage %
Homework/In Class Activities	10%
Quizzes & Weekly Summaries (Discussions)	5%
Professional Practice (three Org. attendance)	5%
Final Project	10%
Lab Memos	15%
MIDTERM EXAMS (Two)	30%
Final Exam	25%
Total	100%

Grading Scale

- **A** - (90% or higher)
- **B** - (80 - 89%)
- **C** - (70 - 79%)
- **D** - (60 - 69%)
- **F** - (Below 60%)

Graded Course Requirements Information

Homework Assignments

- Homework will be assigned on a regular basis (see homework schedule).
- You will need to upload your homework as a single pdf file to canvas no later than 11:59 pm on the due date. No late homework will be accepted except for unusual circumstances.
- Homework must be submitted on engineering paper. Homework solutions not submitted on engineering paper will receive only 90% of the graded credit.
- 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 should be submitted using letter size (8 ½ x 11”) paper. Engineering paper is required.
- 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!

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 suspense 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.

Quizzes & Discussions

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

Weekly Discussions: Every week, you'll be required to post a question or comment on the discussion board related to the topics we've covered. These discussions are designed to help you exchange ideas, stay engaged, provide

feedback to your instructor, and hopefully make the course more interesting and enjoyable for everyone. Participation in these activities is mandatory and accounts for 5% of your total course grade.

In-Class Activities

Active participation in class 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.

Design Project

- The design project consists of a drainage study in Tyler (0050 session) or Houston (0051 session). Each group will present their findings and recommendations on the dates shown in the course schedule.
- You can find more information on Canvas.

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. Example 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 template Word file when you attend professional practice meetings and must complete this for each meeting you attend.
- The due date to submit this is on the last day of class, which is April 20th.

Midterm Exams and Final Exam

- There will be 2 midterm exams and one final examination. The exams are TENTATIVELY scheduled for:
 - Exam 1: Th, Feb 19
 - Exam 2: Th, Mar 26
 - 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 midterm exams are worth 30 points, and the final exam is worth 25 points. The purpose of these 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 backs, but you can see and review in class and in my office.
- 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

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 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 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 and Labs.
- 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.

Tips for Success in this Course

1. **Participate.** I invite you to engage deeply, ask questions, and talk about the course content with your classmates. You can learn a great deal from discussing ideas and perspectives with your peers and professor. Participation can also help you articulate your thoughts and develop critical thinking skills.

2. **Manage your time.** I get it—students usually juggle a lot, and I know you've got commitments beyond this class. Still, doing your best often means carving out enough dedicated time for coursework. Try scheduling specific blocks of time and ensure you have enough room to finish assignments, allowing extra space for any tech issues that might pop up.
3. **Login regularly.** I recommend that you log in to Canvas several times a week to view announcements, discussion posts and replies to your posts.
4. **Do not fall behind.** This class moves at a quick pace and each week builds on the previous class content. If you feel you are starting to fall behind, check in with the instructor as soon as possible so we can troubleshoot together. It will be hard to keep up with the course content if you fall behind in the pre-work or post-work.
5. **Use Canvas notification settings.** Pro tip! Canvas can ensure you receive timely notifications in your email or via text. Be sure to enable notifications to be sent instantly or daily. ([Canvas Notification Guide](#))
6. **Ask for help if needed.** If you are struggling with a course concept, reach out to me and your classmates for support.

FINAL DAY TO WITHDRAW:

The final day to withdraw from the course without penalty is **Feb 05th**.

The last day to withdraw from the course is **Mar 31**.

CENSUS DATES:

The university requires that instructors report the attendance to the register at various points in the semester. Therefore, on **January 27th**, 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.

Communication & Support

- Netiquette (Internet etiquette): 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.
- Communication and Support: In general, the most efficient way to communicate and to get the help you need with your questions and/or concerns is during my office hours. If you meet during my office hours, you can send me an email to schedule a time that suits you. Be professional in writing emails! Follow the following guideline in preparing in all your correspondence:

<ul style="list-style-type: none"> • 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! 	<ul style="list-style-type: none"> • 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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All email correspondence should take place through the Canvas system, and therefore using your Patriot email accounts; check your Patriot email account often. I will try to respond to all emails within 24 hours.

University Policies & Student Resources:

University policies and student resources are available on the University website and in Canvas under “Syllabus”. (You may copy or print the following information to include in your syllabus or use the links provided below.)

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

Calendar of Topics, Readings, and Due Dates *

Wk. #	DATE	LSN	Topic	Reading	Assignments/Lab
1	13-Jan	1	Course Introduction		No Lab
	15-Jan	2	Hydrologic Cycle and water Balance Equation	2.2- 2.4	
2	20-Jan	MLK-NO CLASS			
	22-Jan	3	Hydrologic Cycle and water Balance Equation	2.2- 2.4	HW 1, Lab 01
3	27-Jan	4	Elements of the Hydrologic Cycle: Precipitation	2.5	
	29-Jan	5	Precipitation: Analysis of Point Precipitation Data	2.6	
4	3-Feb	6	Precipitation: Analysis of Point Precipitation Data	2.6	HW 2, Lab 02
	5-Feb	7	Precipitation: Conversion of Point Precipitation to Areal Precipitation	2.7	
5	10-Feb	6	Precipitation: IDF Analysis	2.8	HW 3, Lab 03
	12-Feb	7	Evaporation and Transpiration	3.1-3.9	
6	17-Feb	8	Infiltration	4.2	HW 4, Exam 1 Review
	19-Feb	9	EXAM I		
7	24-Feb	10	Infiltration	4.2	HW 5, Lab 04
	26-Feb	11	Runoff: SCS Curve Number	4.1-4.6	
8	03-Mar	12	Runoff: Rational Method	16.1	HW 6, Lab 05
	05-Mar	13	Hydrograph Analysis	9.1-9.13	
9	10-Mar	14	Hydrograph Analysis	9.1-9.13	HW 7, Lab 06
	12-Mar	15	Surface Water Flow Measurements	8.1-8.8	
-	17-Mar	SPRING BREAK			
	19-Mar				
10	24-Mar	16	Introduction to Hydraulic Structures	13.1 – 13.9	HW 8, Exam review
	26-Mar	17	EXAM II		
11	31-Mar	18	Flow measuring Structures	13.1 – 13.9	HW 9, Lab 07
	02-Apr	19	Flow measuring Structures	13.1 – 13.9	
12	07-Apr	20	Culverts	Handout	HW10, Lab 08
	09-Apr	21	Open Channel flow: Elements of the channel section	14.1-14.2	
13	14-Apr	22	Open Channel flow: Types of flow	14.3-14.4	HW11, Lab 09
	16-Apr	23	Open Channel flow: Concepts of Specific Energy	14.5	
14	21-Apr	24	Uniform Channel flow	14.6	HW12, Presentations
	23-Apr	25	Channel Design	14.7	
15	29-Apr	FINAL EXAM WEEK Please refer to the published exam schedule by the University			
	1-May				

*Note: This is a tentative schedule, and subject to change as necessary – monitor the course page for current deadlines. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.

All assessments and activities have a due date assigned in Canvas. This will populate the assessments and activities on the To-Do list for students in Canvas.

CENG 3361L: General Requirements for Laboratory Reports

LABORATORY TIME & VENUE:

- The Lab of this course is scheduled from 02:30-5:30 PM on Monday-HEC D114(*HEC Campus*), RBS 1027 (*Tyler Campus*)
- Laboratory attendance is mandatory, and any absence will result in a zero grade. Additionally, lab reports will not be accepted if you were not present during the scheduled lab session.

LABORATORY REPORT:

A laboratory report is required for each Lab. Only one lab report is required per group for most labs. There may be, however, labs that require each person to submit their own work. Due dates for each lab will be posted. Each group will need to upload a copy to Canvas. The report should be in the following format:

Cover Page: Laboratory Title, Course Number (CENG 3361L), Your Names and Group Number. Each person in the group signs the cover page indicating that they have read the report and approve of the contents contained within.

Objective: Purpose of the lab should be explained in a few sentences.

Procedure/Theory: Include a summarized procedure of the steps you took to complete this lab. Numbered list is preferred.

Results and Discussion: Present tabulated raw data (Data sheets should be typed in Excel), relevant calculations, and required plots. Sample calculations can be typed or written neatly on engineering paper and placed as an appendix of the report. The remainder of the report should be typewritten. **BE SURE TO USE CAPTIONS FOR FIGURES AND TABLES! REFER TO THESE FIGURES AND TABLES SPECIFICALLY IN THE TEXT USING THE FIGURE/TABLE NUMBER.** Try to have a good understanding of each experiment. Analyze your results. Identify probable sources of error that may have occurred while you performed the laboratory and explain how these errors might affect your results (final value will increase or decrease). **DISCUSS!!** For example, what trends do you notice in the data? Do the results make sense? Are they what you expected? If so, why? If not, why not? Some labs will have more data than others to discuss. Be sure to give a thorough discussion of your results.

Conclusions: Summarize your results. Relate what you have learned from class about the topic to what you have learned from performing in this lab. Explain how this experiment is useful to solve practical civil engineering problems.

Team Contributions form: Students should assess their contribution to group work and their peers' efforts. Identify the members of the group for proper grade recording. Complete the template available on Canvas as "internal group review form".

GRADING:

Contributions towards each lab report grade (out of 100%)

- 5% Objective
- 10% Theory /Procedure
- 30% Calculation
- 30% Results and Discussion
- 15% Conclusion
- 10% Completion of the Internal review form

TENTATIVE LAB SCHEDULE*

Wk.#	Date	Topic	Lab No.
01	01/13	No Lab Meeting (First Week)	
02	01/20	MLK	
03	01/27	Hydrologic Cycle as a Mass Balance	Lab 01
04	02/03	Areal Rainfall and Thiessen Method	Lab 02
05	02/10	Probability and Return Period (IDF-curves)	Lab 03
06	02/17	Exam I review	-
07	02/24	Infiltration	Lab 04
08	03/03	Stormwater Runoff	Lab 05
09	03/10	Watershed Delineation and Design Project	Lab 06
-	03/17	No Lab Meeting (Spring Break)	
10	03/24	Exam II review	-
11	03/31	Hydrographs	Lab 07
12	04/07	Flow Measurements/Weirs	Lab 08
13	04/14	Flow Measurements/Spillways	Lab 09
14	04/21	Project Presentation	-
15	04/28	Final Exams	-

* The Lab schedule is subject to change throughout the semester and the revisions will be noted in lab