

Syllabus

Course Location, Textbook, Instructor Contact Information

Class Meetings:	14:00-14:50 , MWF, CE 205 (Section 001)
Instructor:	Theodore G. Cleveland, CE Room 203F
TA:	none
Office Hours:	T. Cleveland MWF 10:00 - 11:00 T. Cleveland F 13:00-14:00
Telephone:	(806)834-5101
E-mail:	theodore.cleveland@ttu.edu
Website:	http://54.243.252.9/ce-3372-webroot/
Textbook(s) :	citeGupta2017
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Catalog Description

3372. Water Systems Design (3:3:0). Prerequisite: CE 3305¹, 3354². Hydraulic analysis and design of municipal water distribution, stormwater collection, and wastewater collection systems. Oral and written presentations. (Writing Intensive)

Course Objectives

The purpose of this class is to study the theory and application of hydraulics, learn how to use predictive tools such as charts and computer programs, and apply these tools to the analysis and design of distribution and collection and pumping systems. Preparation of professional reports is an equally emphasized objective of this course.

Knowledge, Skills, Abilities (KSA)

During this course the student will

1. Read, synthesize, and communicate ideas presented in current and historical technical literature.
2. Perform flow and transport computation in simplistic topologies using Excel, or **R** as needed³.

¹Mechanics of Fluids

²Engineering Hydrology

³This task is principally to develop understanding of how the professional tools function. Excel and **R** are professional tool in their own right, but the skill level to use them for engineering is beyond the scope of this class.

3. Perform flow and transport computation in realistic geometries using EPA-NET or similar professional tools for water distribution systems.
4. Perform flow and transport computation in realistic geometries using SWMM 5.0 or similar professional tools for stormwater and wastewater collection systems.
5. Size and select engineering materials (pipes, pumps, valves, etc.) for use in the drinking water environment (water distribution), the stormwater environment, and the wastewater environment.
6. Prepare professional reports for the design of a drinking water distribution system, a stormwater collection system, and a wastewater collection system.

ABET Program Outcomes

This course specifically addresses the outcomes listed below. Only the primary outcome is assessed as part of the CECE Continuous Improvement Program.

Primary Outcomes

- (2.)an ability to 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.⁴
- (3.) an ability to communicate effectively with a range of audiences
- (5.) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Secondary Outcomes

- (7.) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

About ABET EAC Criteria

The outcomes above (primary and secondary) are a subset of those prescribed in ABET EAC General Criteria for Bacculuate Programs (ABET, 2024)

Criteria 3, Student Outcomes: The program must have documented student outcomes that support the program educational objectives. Attainment of these outcomes prepares graduates to enter the professional practice of engineering. Student outcomes are outcomes (1) through (7), plus any additional outcomes

⁴The boldface portion is the main emphasis in this course

that may be articulated by the program.

The primary outcomes (above) are assessed as part of the CECE Continuous Improvement Program that is prescribed in ABET EAC General Criteria for Bacculaterate Programs (ABET, 2024)

Criteria 4, Continuous Improvement: The program must regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the program's continuous improvement actions. Other available information may also be used to assist in the continuous improvement of the program.

Course Specific Policies

Any policies stated in this section that differ from University Operating Policies are null and void and the University Operating Policies shall be in force.

Disability:

Texas Tech policy provided as part of syllabus (see last section).

Religious Holidays:

"A student who intends to observe a religious holy day (as defined by OP 34.19) should make that intention known to the instructor prior to the absence in order to receive accommodations prescribed by OP 34.19."

Cellphones/Pagers:

Please set your personal communication devices to silent ring or off during class. Do not take calls in class. Disturbance during class time is not acceptable.

Prerequisites:

Mastery of material from CE 3305 and CE 3354 or equivalent is expected.

Attendance:

Roll will be taken to determine attendance for class participation. Please let the instructor know in advance if you must miss a class for a legitimate reason⁵.

Evaluation Instruments and Grading

Student performance will be evaluated using attendance as measured by completion of on-line lesson reviews (on the class server), exercises (homework), quizzes (administered on the class server), and examinations (administered on the class server). The exams will derive much of their content from the exercises.

Exercises:

Assignments follow most lectures and are due as listed on the class server. ⁶.

1. Every homework assignment is to be accompanied by a descriptive memorandum containing your analysis of the problem. Report materials should be prepared with a word processor. Hand computations may be turned in on engineering paper attached as an appendix to the memorandum. Legibility is determined by the reader; illegible materials will not be graded.
2. Assignments are to be uploaded to the learning management system (LMS) on the assigned date.⁷
3. Due dates are shown in Table ??; Exercises are denoted by ES-#

⁵Legitimate reasons include: Academically-related extracurricular activities (ASCE, AGU, etc.); Illness with documentation; Federal Family Leave Act Policies; Orders to activate (Military, Peace Officer, Public Health, etc.). Bring me some kind of documentation for such absences.

⁶Legibility, correct method, and correct answer are substantial components of grading criteria. The grader will not diagnose sources of arithmetic or algebra errors unless the errors are obvious. Solutions are reviewed in class and posted on the server

⁷The use of a LMS (Learning Management System) is an experiment this semester. The LMS is accessed through the course server. If the LMS is not working, then assignments are due by midnight on the due date. Late assignments are not accepted.

Engineering Reports:

A project report comprised of various components developed during the course is to be completed. The project is introduced early in the semester and is related to the design of a water distribution, stormwater collection, and/or wastewater collection system and accompanying appurtenances. There are two "reports" on the schedule: **RP-1**, and **RP-2**. The reports are to be constructed as a team activity (teams will be selected in the first two weeks of the semester).

Presentations

An engineering presentation is to be completed and presented to the class for peer evaluation. The topic is the same as in **RP-2**. The report is due by each team on the day of presentation.

Exams:

Two examinations will be given, they will be of approximately equal difficulty.

1. Examinations are open notes.
2. Examinations are comprehensive, even though the main focus will be the materials discussed prior to the examination.
3. Full credit for problems will only be given if all computations are documented.
4. Examination dates are shown in Table ??.

Grading:

Final grades are determined based on performance during the semester. Letter grades will be assigned using University standards. The **approximate** weighting of graded material in determining the final grade is as follows:

Item	Percent of Grade
Attendance and Participation	10%
Project Presentation	10%
Project Report-1	10%
Project Report-2	10%
Exercises	20%
Mid-Term Exam	20%
Final Exam	20%

Schedule

Table 1: Spring 2025 Course Schedule

DATE	TOPIC	READINGS
15 Jan 25	1. Introduction	Server Notes
17 Jan 25	2. Semester Project(s)	Server Notes
20 Jan 25	MLK Holiday – no class	NONE
22 Jan 25	3. Design Guidelines – Drinking Water Supply	Gupta (2017) pp. 667-668
24 Jan 25	4. Design Drawings and Maps	Server Notes
27 Jan 25	5. Demand Estimation – Population Projections	Gupta (2017) pp. 1-39
29 Jan 25	6. Pipeline Hydraulics – Review	Gupta (2017) pp. 633-652
31 Jan 25	7. Pumps and Pumping Systems	Gupta (2017) pp. 672-689
03 Feb 25	8. Storage Systems	Gupta (2017) pp. 668-672
05 Feb 25	9. Pipe Networks – Background	Gupta (2017) pp. 656-668
07 Feb 25	10. Numerical Methods (no pumps)	Gupta (2017) pp. 664-668
10 Feb 25	11. Numerical Methods (with pumps)	Gupta (2017) pp. 664-668
12 Feb 25	Job Fair – no class	NONE
14 Feb 25	12. Pipeline Transients – Rigid vs. Elastic	Server Notes
17 Feb 25	13. Numerical Methods – Timed valve closure	Server Notes
19 Feb 25	14. EPANET introduction	Server Notes
21 Feb 25	15. Exam 1	Blackboard
24 Feb 25	16. EPANET pumps	Server Notes
26 Feb 25	17. EPANET demand patterns	Server Notes
28 Feb 25	18. EPANET water quality	Server Notes
03 Mar 25	19. Project Workshop	Server Notes
05 Mar 25	20. Design Guidelines – Storm Water Collection	Gupta (2017) pp. 699-701
07 Mar 25	21. Stormwater Hydrology – Review	Gupta (2017) pp. 711-728
10 Mar 25	22. Stormwater Collection – Inlets	Server Notes
12 Mar 25	23. Stormwater Collection – Conduit Sizing	Gupta (2017) pp. 729-734
14 Mar 25	24. SWMM introduction	Server Notes
24 Mar 25	25. SWMM hydrology	Server Notes
26 Mar 25	26. SWMM conduits	Server Notes
28 Mar 25	27. SWMM storage and pumps	Server Notes

Table 2: Spring 2025 Course Schedule - Continued

DATE	TOPIC	READINGS
31 Mar 25	28. Detention Ponds	Server Notes
02 Apr 25	29. Green-Infrastructure	Server Notes
04 Apr 25	30. Exam 2	Blackboard
07 Apr 25	31. SWMM water quality	Lesson-22
09 Apr 25	32. Design Guidelines – Sanitary Sewer Systems	Gupta (2017) pp. 702-711
11 Apr 25	33. Project Workshop	Blackboard
14 Apr 25	34. Waste Water Collection	Gupta (2017) pp. 702-711
16 Apr 25	35. Inflow and Infiltration	Server Notes
18 Apr 25	36. Outfall Considerations	Server Notes
21 Apr 25	Holiday – no class	NONE
23 Apr 25	37. Project Workshop	Server Notes
25 Apr 25	38. Project Workshop	Server Notes
28 Apr 25	39. Project Presentations Teams 1-3	Server Notes
30 Apr 25	40. Project Presentations Teams 4-6	Server Notes
02 May 25	41. Project Presentations Teams 7-9	Server Notes
05 May 25	42. Project Presentations Teams 10-12	Server Notes
xx May 25	Exam 3	Blackboard

References

- Gupta, R.S. 2017. *Hydrology and Hydraulic Systems* 4th ed. Waveland Press, Inc. ISBN 978-1-4786-3091-3 888p.
- ABET (2024) Criteria for Accrediting ENGINEERING PROGRAMS. ABET, 415 North Charles St., Baltimore, MD 21201 [FREE DOWNLOAD] @ https://www.abet.org/wp-content/uploads/2023/03/23-24-EAC-Criteria_FINAL2.pdf
- Chin, D. (2006). *Water Resources Engineering, 2 ed.* Prentice Hall, Inc.
- Mays, L. W. (2011). *Water-Resources Engineering*. Wiley.
- Wurbs, R.A., and James, W. P. (2002). *Water Resources Engineering* Prentice Hall; pp.130-156; and 156-198.
- NCEES (2008). *Fundamentals of Engineering Supplied Reference Handbook* (8th ed.). 280 Seneca Creek Road, Clemson, SC 29631: National Council of Examiners for Engineering and Surveying ISBN 978-1-932613-37-7.
- Roberson, J. A., Cassidy, J. J., and Chaudry, M. H. (1988). *Hydraulic Engineering*. Houghton Mifflin.
- Rossman, L. (2000). EPANET 2 users manual. Technical Report EPA/600/R-00/057, U.S. Environmental Protection Agency, National Risk Management Research Laboratory Cincinnati, OH 45268.
- Rossman, L. (2009). Storm Water Management Model user's manual version 5.0. Technical Report EPA/600/R-05/040, U.S. Environmental Protection Agency, National Risk Management Research Laboratory Cincinnati, OH 45268.

University Policies

Policies stated in this section override any policies in the course specific policies section above.

These University Operating Policies are provided as directed and cover institutionally required information including: ADA Statement, Academic Integrity, Religious Holy Day Statement.

Additionally the institutionally suggested statements are also included in the syllabus. These statements cover topics related to discrimination, civility, and diversity.

The University ADA Policy is presented verbatim – students requesting accommodations must do so using the procedures defined in the policy.

Certain Statements Required and Recommended for Course Syllabi

Please reference [OP 32.06](#) for comprehensive information about syllabus requirements and faculty responsibility. Following is a brief summary of required and optional inclusions, but the [OP](#) provides broader context and explanation. If you want to provide general information about calendars, deadlines, and/or other student services information in your syllabus, please do so by including links to the appropriate institutional websites (e.g., Student Business Services, catalog.ttu.edu, Financial Aid, etc.).

INSTITUTIONALLY REQUIRED INFORMATION TO INCLUDE IN ALL SYLLABI:

ADA STATEMENT:

Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note: instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services in West Hall or call 806-742-2405.

ACADEMIC INTEGRITY STATEMENT:

Academic integrity is taking responsibility for one's own class and/or course work, being individually accountable, and demonstrating intellectual honesty and ethical behavior. Academic integrity is a personal choice to abide by the standards of intellectual honesty and responsibility. Because education is a shared effort to achieve learning through the exchange of ideas, students, faculty, and staff have the collective responsibility to build mutual trust and respect. Ethical behavior and independent thought are essential for the highest level of academic achievement, which then must be measured. Academic achievement includes scholarship, teaching, and learning, all of which are shared endeavors. Grades are a device used to quantify the successful accumulation of knowledge through learning. Adhering to the standards of academic integrity ensures grades are earned honestly. Academic integrity is the foundation upon which students, faculty, and staff build their educational and professional careers. [Texas Tech University ("University") Quality Enhancement Plan, Academic Integrity Task Force, 2010]

RELIGIOUS HOLY DAY STATEMENT:

"Religious holy day" means a holy day observed by a religion whose places of worship are exempt from property taxation under Texas Tax Code §11.20. A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence. A student who is excused under section 2 may not be penalized for the absence; however, the instructor may respond appropriately if the student fails to complete the assignment satisfactorily.

INSTITUTIONALLY SUGGESTED INFORMATION TO INCLUDE IN ALL SYLLABI

DISCRIMINATION, HARASSMENT, AND SEXUAL VIOLENCE STATEMENT:

Texas Tech University is committed to providing and strengthening an educational, working, and living environment where students, faculty, staff, and visitors are free from gender and/or sex discrimination of any kind. Sexual assault, discrimination, harassment, and other [Title IX violations](#) are not tolerated by the University. Report any incidents to the Office for Student Rights & Resolution, (806)-742-SAFE (7233) or file a report online at titleix.gu.edu/students. Faculty and staff members at TTU are committed to connecting you to resources on campus. Some of these available resources are: TTU Student Counseling Center, 806-742-3674, <https://www.depts.gu.edu/scc/> (Provides confidential support on campus.) TTU 24-hour Crisis Helpline, 806-742-5555, (Assists students who are experiencing a mental health or interpersonal violence crisis. If you call the helpline, you will speak with a mental health counselor.) Voice of Hope Lubbock Rape Crisis Center, 806-763-7273, voiceonopelubbock.org (24-hour hotline that provides support for survivors of sexual violence.) The Risk, Intervention, Safety and Education (RISE) Office, 806-742-2110, <https://www.depts.gu.edu/rise/> (Provides a range of resources and support options focused on prevention education and student wellness.) Texas Tech Police Department, 806-742-3931, <http://www.depts.gu.edu/gpd/> (To report criminal activity that occurs on or near Texas Tech campus.)

CIVILITY IN THE CLASSROOM STATEMENT:

Texas Tech University is a community of faculty, students, and staff that enjoys an expectation of cooperation, professionalism, and civility during the conduct of all forms of university business, including the conduct of student–student and student–faculty interactions in and out of the classroom. Further, the classroom is a setting in which an exchange of ideas and creative thinking should be encouraged and where intellectual growth and development are fostered. Students who disrupt this classroom mission by rude, sarcastic, threatening, abusive or obscene language and/or behavior will be subject to appropriate sanctions according to university policy. Likewise, faculty members are expected to maintain the highest standards of professionalism in all interactions with all constituents of the university (www.depts.gu.edu/ethics/matadorchallenge/ethicalprinciples.php).

LGBTQIA SUPPORT STATEMENT*:

I identify as an ally to the lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA) community, and I am available to listen and support you in an affirming manner. I can assist in connecting you with resources on campus to address problems you may face pertaining to sexual orientation and/or gender identity that could interfere with your success at Texas Tech. Please note that additional resources are available through the Office of LGBTQIA within the Center for Campus Life, Student Union Building Room 201, www.lgbtqia.gu.edu, 806.742.5433.”

*If you prefer to list campus resources rather than a statement about ally status, you might include the following among other campus resources you wish to share:

Office of LGBTQIA, Student Union Building Room 201, www.lgbtqia.gu.edu, 806.742.5433 within the Center for Campus Life, the Office serves the Texas Tech community through facilitation and leadership of programming and advocacy efforts. This work is aimed at

strengthening the lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA) community and sustaining an inclusive campus that welcomes people of all sexual orientations, gender identities, and gender expressions.



TEXAS TECH UNIVERSITY™

Operating Policy and Procedure

OP 10.08: Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act (Section 504)

DATE: March 26, 2013

PURPOSE: The purpose of this Operating Policy/Procedure (OP) is to ensure understanding of the university's responsibilities under the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act (Section 504).

REVIEW: This OP will be reviewed in November of even-numbered years by the senior vice provost and the associate vice provost for student affairs with substantive revisions forwarded to the provost and senior vice president.

POLICY/PROCEDURE

1. Policy

- a. The Americans with Disabilities Act (ADA) of 1990 (PL 101-336) mandates equal opportunities for persons with disabilities in all public facilities, programs, activities, services, and benefits derived from them. Section 504 of the Rehabilitation Act of 1973 (PL 93-112), as amended, and PL 93-516 mandate equal opportunity for qualified persons with disabilities in all programs, activities, and services of recipients of federal financial assistance. Both ADA and Section 504 are civil rights statutes that prohibit discrimination on the basis of disability, obligate colleges and universities to make certain adjustments and accommodations, and offer to persons with disabilities the opportunity to participate fully in all institutional programs and activities. Texas Tech University adheres to these regulations and the Texas Commission on Human Rights Act.

In addition, on September 23, 1996, the U.S. Department of Justice issued certification that the Texas Accessibility Standards, the Texas Architectural Barriers Act, and the Architectural Barriers Administrative Rules meet or exceed the new construction and alterations requirements of Title III of the Americans with Disabilities Act. Texas Tech University is compliant with these regulations.

- b. Texas Tech University provides that all educational and other programs and activities are available to persons with disabilities in the most integrated setting appropriate. Students, employees, applicants, and other individuals with disabilities served by Texas Tech are not segregated, separated, or treated differently on the basis of a disability. Texas Tech University will make reasonable accommodation for the known physical or mental impairment of qualified individuals with disabilities. Reasonable accommodation includes modification or adjustment of a job process that will enable a qualified individual with a disability to perform the essential functions of his or her job.
- c. Texas Tech University does not require persons with disabilities to take advantage of all adjustments, accommodations, or special services that might be available to persons with similar disabilities.

- d. Any qualified individual with a disability may request a reasonable accommodation if her/his disability limits one or more life activities, has a record of such impairment, or is regarded as having such impairment. A qualified individual with a disability can perform the essential functions of the position with or without reasonable accommodation.

2. Procedures

- a. Communications and printed materials for students, employees, and program participants, as well as prospective students, employees, and participants, are accessible to persons who require Braille, large print, taped formats, sign language interpreters, or by Telecommunications Device for the Deaf (TDD). Those requiring such accommodation are requested to notify the appropriate program sponsor within 72 hours of the need for such accommodation so that there will be time to provide accessible materials. Classroom accommodation may take three to five working days notice.
- b. The president of Texas Tech University or designee will be responsible for overseeing the reasonable workplace accommodation policy and procedures to ensure compliance. The campus ADA and Section 504 coordinator is the managing director of Student Disability Services, located in West Hall, Room 335, (806) 742-2405. The ADA and Section 504 coordinator will take complaints and concerns regarding compliance issues and direct them to the appropriate entity for attention.
- c. Any employee requiring an accommodation shall notify her/his supervisor and inform the supervisor of the nature of the disability. The employee shall provide a medical statement that contains a diagnosis, prognosis, and an evaluation explaining the impact the impairment will have on the employee's ability to perform the essential functions of the employee's position. The statement should also identify the major life activity that is substantially limited as a result of the disability.
- d. If the employee is a faculty member, copies of this documentation should be provided to the ADA compliance officer for faculty, the senior vice provost, in the Administration Building, Room 104, (806) 742-2184. In the case of an accommodation for a member of the staff, documentation should be provided to the Office of the Managing Director of Human Resources, Doak Conference Center, Room 166, (806) 742-3851. In the case of a request for accommodation from a student, copies of the documentation should be provided to the managing director of Student Disability Services in West Hall, Room 335, (806) 742-2405. Students should also refer to OP 34.22 for guidelines on establishing reasonable accommodation.
- e. Based on the information provided, the university designee assigned to the relevant group, along with the immediate supervisor, will establish procedures for providing reasonable accommodation. In the case of a student, Student Disability Services will consult with all parties to assure that reasonable accommodation is accomplished.
- f. If accommodation would constitute an undue hardship for the university in the form of costs involved, impact on operations and business, or risk to the safety of the requestor or others, the university designee and the immediate supervisor, or staff of Student Disability Services in the case of a student, shall prepare documentation stating the reasons for such a decision.

- g. Texas Tech University will maintain the confidentiality of all medical and ADA information concerning employees and students. These records will be kept separate from personnel files and will be accessible only to authorized personnel.

3. Notices

a. Faculty

- (1) Faculty members are required to insert the following into each course syllabus:

Any student who, because of a disability, may require special arrangements in order to meet the course requirements should contact the instructor as possible to make necessary arrangements. Students must present appropriate verification from Student Disability Services during the instructor's office hours. Please note that instructors are not allowed to provide classroom accommodation to a student until appropriate verification from Student Disability Services has been provided. For additional information, please contact Student Disability Services office in 335 West Hall or call 806-742-2405.

- (2) Faculty members are required to announce the following within the first two class periods:

"I would appreciate hearing from anyone who has a disability that may require special accommodation. I am sure we can work out whatever arrangements are necessary. Please make an appointment with me during my office hours."

b. General Public

- (1) The following statement should be included in materials developed and available through the university:

Texas Tech University provides for program accessibility for members of the public. Those requiring accessible materials in Braille, large print, tape format, use of a sign language interpreter, or Telecommunications Device for the Deaf are requested to notify the university at least 72 hours before the need for such services in order that time will be adequate for their preparation.

- (2) Such notice should be inserted in university-related programs open to the public.

4. Grievance

- a. ADA provides for private right of action for injunctive relief, attorney fees, and compensatory damages against both individuals and institutions. At least one person is required to be designated to receive ADA and/or Section 504 grievances and to coordinate an institution's effort under ADA and Section 504. At Texas Tech University, they are as follows:

- (1) Employee and Public Concerns – Senior Vice Provost, Administration Building, Room 104, (806) 742-2184.
- (2) Student Concerns –Associate Vice Provost for Student Affairs, Student Union Building, Room 201AA, (806) 742-2984.

- b. Texas Tech University fully complies with ADA and Section 504 guidelines on employment of people with disabilities. Skills or aptitudes necessary to perform the job are clearly stated and available to applicants.