

COURSE SYLLABUS
CE 5388—Pipeline Construction and Trenchless Technology

COURSE SYLLABUS
The University of Texas at Arlington
College of Engineering
Department of Civil Engineering
CE 5388 – Pipeline Construction and Trenchless Technology
(3 Credit Hours)

Instructor: Dr. Mohammad Najafi, P.E.

Office Numbers: 428 Nedderman Hall

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Email Address: najafi@uta.edu

Office Hours: Tuesday and Thursday 5:20 PM-6:30 PM or by appointment

Course Number, Section Number, and Course Title:

CE 5388, Sec 001 (53697) & 002 (53705),

Pipeline Construction and Trenchless Technology

Time and Place of Class Meetings: Tu Th 3:30-5:20 PM, Room 229 Nedderman Hall

Teaching Assistant (TA): Babak Haji

Office Number: Civil Engineering Laboratory Building (CELB) – Room 141

Office Telephone Number: 817-272-9164

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Office Hours: Tuesday and Thursday, 10:00 AM - 12:00 PM (Additional Office Hours by Appointment).

Description of Course Content: Pipeline and utility design, construction and renewal. Topics include pipeline infrastructure structural considerations, planning and construction considerations, pipe materials, and trenchless technologies. Prerequisite: Graduate standing and consent of instructor.

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Student Learning Outcomes: The course objective is to prepare students to demonstrate sound engineering judgment for managing the construction, repair, and maintenance of underground pipelines. In addition, this course will focus on the following student abilities and co-educational outcomes.

1. Fundamental Knowledge – Student will develop an understanding of factors affecting the selection of trenchless technology methods for particular renewal, repair, and construction projects.
2. Independent Abilities – Student will discuss and elucidate the difference between the various design and construction methods of underground infrastructure using trenchless technology.
3. Critical Thinking – Student will demonstrate ability to assess, interpret and understand a research topic related to underground pipeline design, construction, renewal, and to minimize surface and subsurface disruptions via paper and class participations.

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4. Advanced Knowledge – Student will analyze complex problems to determine/identify applicable design options and potential methods to construct, repair, or renew underground pipelines using trenchless technology.
5. Effective Communication – Student will demonstrate effective communication skills via class discussions, reports, and presentations.
6. Sustainability and Social Issues – Student will explain how advanced technologies and proper planning and preparation will assist in retaining underground infrastructure assets and reduce adverse impacts sudden failures and disruption of these lifeline systems.

All outcomes are observed implicitly through class participation, exams, assignments, reports and formal/informal communications with instructor.

Required Textbooks and Other Course Materials:

Najafi, M. (2013). *Trenchless Technology: Planning, Equipment, and Methods*. McGraw-Hill, New York.

Additional References

Najafi, M. and Gokhale, S. (2005). "Trenchless Technology: Pipelines and Utility Design, Construction and Renewal." McGraw-Hill, New York, NY.

Najafi, M. (2010). "Trenchless Technology Piping: Installation and Inspection." McGraw-Hill, New York, NY.

Watkins, R. K., and Anderson, L. R. (2000). *Structural Mechanics of Buried Pipes*, CRC Press, Boca Raton, Fla.

Moser, A. P., and Folkman, S. (2008). *Buried Pipe Design*, 3d ed., McGraw-Hill, New York.

Descriptions of major assignments and examinations with due dates: See course outline for more details. There will be one midterm and one final exam, one term project with presentation, and several weekly assignments. For participation points, students are encouraged to participate in class discussions and ask questions.

NOTE: The assignments are due at the beginning of class. See the Tentative Course Outline. Instructions will be provided in class.

The exams will generally relate to the material covered in lecture or in assignments. The philosophy of the exam is not to merely test your total recall or memorization, but to extend your thinking from theory and example problems to engineering situations.

Sec 001 (53697) Students: Need to attend all the classes, take exams and submit all the assignments in class.

Sec 002 (53705) Students: Need to participate in class discussions through daily Blackboard. Weekly assignments must be submitted through Blackboard *before start of class*. Students must attend exams in class if within 50 miles radius of campus. If not, arrangements must be made in advance with the instructor to find an approved proctor to take the exam at the same time with other students.

Project & Presentation: Instructions will be provided in class.

Provide a cover sheet that includes your name, title of the paper, and the date. Your last name must appear in the upper right corner and the page numbers must be centered in the bottom of each page. The project report shall follow closely ASCE guidelines.

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Grading Policy: Grades will be determined according to the following scale (the grading scale may be lowered at the discretion of the instructor, but will not be raised):

Grade	% Required
A	90 -100
B	80-89
C	70-79
D	60-69
F	Less than 60

Students will be required to accumulate points from the following:

Weekly Assignments	20%
Class Attendance and Participations	15%
Term Project & Presentation	25%
Midterm Exam	20%
Final Exam	20%
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Total	100%

Attendance Policy: Students are expected to attend all classes. For total professional development, class participation and oral discussions will be encouraged. Everyone is asked to arrive on time and be seated promptly for duration of class to minimize the disruption to others.

See the “**Make-up Exam and Assignment Policy**” section for accommodations of incomplete or missed assignments.

Class Participation Points: will be discussed in class.

Drop Policy: Please see university drop policy and deadlines in the Graduate Catalog for official methods and policies. An overall summary drop/withdraw policies of concern are listed below. Graduate students who wish to change a schedule by dropping a course must first consult with their Graduate Advisor. Regulations pertaining to adding or dropping courses are described below. The last day to drop a course taught in regular semesters is at the end of the 12th week of class. The last day to drop a course in the other, non-traditional semesters corresponds to 75 percent of the duration of the course. The last day to drop a course is listed in the Academic Calendar available.

1. A student dropping a graduate course after the Census Date but on or before the end of the last day to drop a course may with the agreement of the instructor, receive a grade of W but only if passing the course with a C or better average. A grade of W will not be given if the student does not have at least a C average. In such instances, the student will receive a grade of F if he or she withdraws from the class.
2. A student desiring to drop all courses in which he or she is enrolled is reminded that such action constitutes withdrawal (resignation) from the University. The student must indicate intention to withdraw and drop all courses by filing a resignation form in the Office of the Registrar or by Web at www.uta.edu/registrar.
3. In most cases, a student may not drop a graduate course or withdraw (resign) from the University after the last day to drop a course. Under extreme circumstances, the Dean of Graduate Studies may consider a petition to withdraw (resign) from the University after the last day to drop a course, but in no case may a graduate student selectively drop a course after the last day to drop a course and remain enrolled in any other course. Students should use the special Petition to Withdraw for this purpose. See the section titled Withdrawal (Resignation) From the University

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section of the Graduate Catalog, <http://grad.uta.edu/leftMenuPages/gradcalendar.asp>, for additional information concerning withdrawal.

Students wanting to drop all courses for which they are enrolled must withdraw from the University.

A student who wishes to withdraw (resign) voluntarily from the University before the last day to drop a course deadline must file a resignation form in the Office of the Registrar or file online at www.uta.edu/registrar. After the last day to drop a course deadline, a graduate student or undergraduate student enrolled in a graduate course is not permitted to withdraw or to selectively drop courses. In exceptional cases, however, a graduate student may request to withdraw after the last day to drop a course deadline by obtaining a Petition to Withdraw form and submitting it to the Dean of Graduate Studies. (Students should use the special Petition to Withdraw for this purpose and not the Petition form used for other types of requests.) If the petition is not approved, the student remains responsible for all coursework requirements. Therefore, students should not discontinue class attendance or course assignments unless they have been notified in writing that the Dean of Graduate Studies has approved the petition to withdraw. A Petition to Withdraw form is available online through the Virtual Graduate School Advisor or in the Graduate School office.

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 - The Rehabilitation Act of 1973 as amended. With the passage of federal legislation entitled *Americans with Disabilities Act (ADA)*, pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.

As a faculty member, I am required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate based on that disability. Student responsibility primarily rests with informing faculty of their need for accommodation and in providing authorized documentation through designated administrative channels. Information regarding specific diagnostic criteria and policies for obtaining academic accommodations can be found at www.uta.edu/disability. In addition, you may visit the Office for Students with Disabilities in room 102 of University Hall or call them at (817) 272-3364.

Academic Integrity: All students are expected to pursue their academic careers with honesty and integrity. Academic dishonesty includes, but is not limited to, cheating on a test or other course work, plagiarism (offering the work of another as one's own) and unauthorized collaboration with another person. Students found responsible for dishonesty in their academic pursuits are subject to penalties that may range from disciplinary probation to suspension to expulsion from the University.

In accordance with the Rules and Regulations of the Board of Regents of The University of Texas System (Part One, Chapter VI), institutional procedures regarding allegations of academic dishonesty are outlined in Part Two, Chapter 2, of the UT Arlington Handbook of Operating Procedures. This information may be obtained by accessing the Student Judicial Affairs Web site at www2.uta.edu/discipline/ or by obtaining a hard copy of Mav Dates & Data in the Office of Student Development.

Student Support Services Available: The University of Texas at Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. These resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals to resources for any reason, students may contact the Maverick Resource Hotline at 817-272-6107 or visit www.uta.edu/resources for more information.

Librarian to Contact: Sylvia George-Williams, Science and Technology Library, NH.

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Electronic Communication Policy: The University of Texas at Arlington has adopted the University "MavMail" address as the sole official means of communication with students. MavMail is used to remind students of important deadlines, advertise events and activities, and permit the University to conduct official transactions exclusively by electronic means. For example, important information concerning registration, financial aid, payment of bills, and graduation are now sent to students through the MavMail system. All students are assigned a MavMail account. ***Students are responsible for checking their MavMail regularly.*** Information about activating and using MavMail is available at <http://www.uta.edu/oit/email/>. There is no additional charge to students for using this account, and it remains active even after they graduate from UT Arlington.

To obtain your NetID or for logon assistance, visit <https://webapps.uta.edu/oit/selfservice/>. If you are unable to resolve your issue from the Self-Service website, contact the Helpdesk at helpdesk@uta.edu.

UTA's E-mail is the prime means for communication. Therefore, the University and the Instructor have the right to send communications to students via e-mail and the right to expect that those communications will be received and read in a timely fashion. The Office of Information Technology (OIT) will assign all students an official University e-mail address. It is to this official address that the University will send e-mail communications. Students are expected to check their official e-mail account on a frequent and consistent basis to stay current with University communications. The University recommends checking e-mail daily; in recognition that certain communications may be time-critical.

A student must give current and correct local and permanent addresses and telephone numbers to the Office of the Registrar and must notify this office immediately of any changes. Official correspondence may be mailed, versus e-mailed, to the appropriate address depending upon the nature of the correspondence and the academic calendar; if the student has moved and failed to correct this address, he or she will not be relieved of responsibility on the grounds that the correspondence was not delivered.

Make-up Exam and Assignments Policy: No make-up exams and assignments are given or accepted.

Grade Grievance Policy: It is the obligation of the student, in attempting to resolve any student grievance regarding grades, first to make a serious effort to resolve the matter with the instructor with whom the grievance originated. Individual instructors retain primary responsibility for assigning grades. The instructor's judgment is final unless compelling evidence shows discrimination, preferential treatment or procedural irregularities. If students wish to appeal, their requests must be submitted in writing on an Academic Grievance Form available in departmental or program offices to the department chair or program director. Before considering a grievance, the department chair or program director will refer the issue to a departmental or program committee of graduate faculty. If the committee cannot reach a decision acceptable to the parties involved, the department chair or program director will issue a decision on the grievance. If students are dissatisfied with the chair or director's decision, they may appeal the case to the academic dean. If they are dissatisfied with the academic dean's decision, they may appeal it to the Dean of Graduate Studies. Students have one year from the day grades are posted to initiate a grievance concerning a grade.

For issues involving scholastic dishonesty, see the Academic Dishonesty entry in the UTA undergraduate catalog.

Laptop or Email use in the classroom: In order to minimize distraction, the use of laptop and Email in the classroom will not be allowed.

Cellular Phone use in the classroom: In order to minimize distraction, turn off the cell phone or change the setting to 'vibrate.' If it is necessary to use it due to an emergency, please leave the classroom quietly and return when done.

Blackboard Site: Handouts, notes, articles, and other information will be posted on Blackboard

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Tentative Course Outline

Day	Date	Topic	Learning Objectives	Text References	Assignment Due
Tue	June 4	Course Introduction	Pipelines and Trenchless Technology Background and Introduction	Chap 1	
Thurs	June 6	New Installation	Overview of Trenchless Technologies—New Installation Methods	Chap 1	
Tue	June 11	Drilling Fluids	Principles of Drilling Fluids	Chap 7 Guest Lecture Mr. Frank Canon	
Thurs	June 13	Pipe Materials I	<ol style="list-style-type: none"> 1. Pipe-Soil Interaction – Rigid and Flexible Pipes 2. Pipe materials for Trenchless Technology – Metallic pipes (Steel, DIP, Corrugated Steel Pipe), Rigid/Cementitious pipes (Vitrified Clay Pipe, Concrete gravity and pressure pipes), Plastic Materials (PVC, Fusible PVC, HDPE, Fiberglass Pipe) 	Guest Lecture Mr. Shah Rahman	Assignment 1
Tue	June 18	Pipe Materials II	<ol style="list-style-type: none"> 3. Steel Pipe Design and Installation for Open Cut Construction 4. Large Diameter Pipelines (Steel and Concrete pressure pipes) 5. Rehabilitation of PCCP with Steel Pipes (Relining and Sliplining) 	Guest Lecture Mr. Shah Rahman	
Thurs	June 20	Pipeline Inspection	Pipeline Asset Management and Inspection	Guest Lecture Dr. Andy Dettmer	Assignment 2
Tue	June 25	Horizontal Directional Drilling	HDD Method Description, Features, and Case Study	Chap 8 Guest Lecture Jonathan Faughtenberry, P.E.	
Thurs	June 27	Principles of Locating and Tracking	Locating and Tracking for HDD Projects	Chap 6 Guest Lecture Mr. Craig Caswell	Assignment 3
Tue	July 2	CIPP	CIPP Planning, Design and Installation	Chap 14 Guest Lecture Mr. Tim Peterie	
Thurs	July 4	Independence Day			

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Tue	July 9	Rock Mass Properties	Rock Mass Properties for Trenchless Technology Feasibility	Chap 5 Guest Lecture Mr. David Scarpato, P.E.	
Thurs	July 11	Exam I			
Tue	July 16	Horizontal Directional Drilling	Planning and Construction Requirements for Horizontal Directional Drilling	Chap 8	
Thurs	July 18	Pipe Jacking	Pipe Jacking and Utility Tunneling	Chap 13	Assignment 4
Tue	July 23	Pipe Renewal	Design of Pipe Lining Methods	Chap 18	
Thurs	July 25	Pipe Replacement Methods	Planning and Construction Requirements for Pipe Bursting		Assignment 5
Tue	July 30		Horizontal Auger Boring, Pipe Ramming, Pilot Tube, and Microtunneling	Chap 9, 10, 11, 12	
Thurs	August 1	Student Presentations			
Tue	August 6	Student Presentations			
Thurs	August 8	Student Presentations			
Tue	August 13	Final Exam			