COURSE SYLLABUS

The University of Texas at Arlington

College of Engineering

Department of Civil and Environmental Engineering

CE 5389

PIPELINE INFRASTRUCTURE ASSET MANAGEMENT

(3 Credit Hours)

Instructors: G. Khankarli, Ph.D., P.E., PMP

Office Numbers: TBD

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Email Address khankarl@uta.edu,

Office Hours: Monday through Thursday 5:30 pm-6:00 pm or by appointment

Course Number, Section Number, and Course Title: CE 5389-001/002, Pipeline Infrastructure Asset Management

Time and Place of Class Meetings: Tuesday and Thursday, 6:00 – 7:50 PM; NH 203

Description of Course Content: Infrastructure inventory, inspection, and life cycle costs. Topics include pipeline deterioration parameters, asset management technologies, risk assessment, government regulations and case studies. Prerequisite: graduate standing and consent of instructor.

Course Objectives:

(1) Possess a broad-based civil engineering education to successfully obtain professional positions, and practice civil engineering in a wide range of professional settings including consulting firms, industries, and government agencies.
(2) Exhibit professional growth throughout their careers by taking on increasing professional responsibilities, and pursue life-long learning by participation in job-related training activities, and/or attending graduate school, and obtaining professional engineering license.

***Specific* Course Learning Outcomes:** Upon completion of the course, the student will:

(1) Understand infrastructure and its role
(2) Understand Infrastructure planning principles
(3) Understand general asset management principles
(4) Understand major sources of funding and total project cost principles
(5) Understand the process of identifying and responding to risk
(6) Understand pipeline asset management decision support system
(7) Explore ways to quantitatively analyze, select optimal planning alternatives for assets

Requirements: SOFTWARE:

Student should have a working knowledge of and access to Microsoft Word®, Microsoft Excel®, Microsoft PowerPoint®.

Required Textbooks and Other Course Materials:

1) Handouts, notes, reading assignments, problem solutions and other information are located on the class Blackboard site.

Referenced Textbooks

1) Najafi, M. and Gokhale. S. (2005). *Trenchless Technology: Pipeline and Utility Design, Construction and Renewal*. McGraw-Hill, New York.
2) Amekudzi, A. and McNeil. S. 2008. *Infrastructure Reporting and Asset Management*. American Society of Civil Engineers, Virginia.
3) Goodman, Alvin S. and Makarand Hastak. (2006). *Infrastructure Planning Handbook: Planning, Engineering, and Economics*. McGraw-Hill/ASCE, New York, NY.

Descriptions of major assignments and examinations with due dates:

ALL students (including Distance Learners) must take ALL Tests in class, in person

Responses to the tests should be as follows to receive maximum credit:

1) Only blue or black pen is acceptable; should you make an error simply strike through it.
2) Include your full name.
3) Legible handwriting is a must.

Homework/Article Review (AR) assignments, a research paper and presentation, and two exams constitute the assignments and testing in this class.

All assignments must be turned in at the start of the class or, if, submitted electronically with the instructor's approval, prior to the class period in which they are due. Failure to do so will constitute a grade of zero for the assignment in question.

One week of advanced notice will be provided in scheduling each exam. The final exam will be given on the scheduled date according to the university's published final exams schedule. The final presentation is scheduled on the date shown in the course outline. Note that failure to appear for an exam/presentation at the scheduled time will constitute a grade of zero in that exam/presentation.

Homework/AR and paper in this class are the minimum assignments considered adequate to achieve basic proficiency of course material. Homework will be discussed in class. When doing the homework, specify date, name, course, and problem number at top of each page. Each problem is to be started on a new page, as applicable. Include at the beginning of the problem, the problem statement and any diagrams given as well as any additional diagram needed to solve the problem. Then show solution. If calculations are required, all calculations should show four (4) significant figures for intermediate values calculated. Final answer should be rounded to two (2) significant figures unless all data is greater than three (3) significant figures. Then use minimum number of significant figures dictated by problem (greater than 3). When establishing elevations or distances for design drawing, answers must be in hundreds of a foot or thousands of a meter.

The exams will generally relate to the material covered in the lectures 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. Each exam may include both open and closed book portions.

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

Grading Policy: Grades are based on two exams, review of four peer reviewed articles, homework assignments, group research paper, presentation, and attendance/participation. Grades will be determined by averaging the exams and all assignments

All assignments must be turned in at the start of the class or, if submitted electronically, prior to the start of the class period in which they are due. Electronic submission to the instructor's published email address is only available for distance learning students and for students who made prior arrangements with the instructor. Late assignments will not be accepted.

The final exam will be given according to the university's published final exams schedule.

The exams will generally relate to the material covered in the lectures 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. Each exam may include both open and closed book portions.

A) Tests:

Students are expected to seat themselves with at least 1 empty seat between other students.

ITEMS ALLOWED/NOT ALLOWED DURING QUIZZES, TESTS or EXAMS:
No items (backpacks, cell-phones, i-pods, etc.) are allowed on the desk except as noted below:

"Closed Book" means Students may not have anything on their desk area during the test except: Blue pen, calculator.

"Open Book" means Students must work independently to complete the assigned requirements, if assigned.

1) Midterm Exam

There will be a midterm exam which will cover material discussed in the **lectures** and in **guest presentations,** as applicable. The midterm exam represents 20**%** of the student's final grade.

2) Final Exam

There will be a final exam which will cover material discussed in the **lectures** and in **guest presentations** as applicable. The final exam represents 20**%** of the student's final grade.

B) HOMEWORK/AR AND RESEARCH PROJECTS:

The primary assignments for homework/AR will be reading and working problems assigned by the Instructor. Late homework (i.e., turned in after class has started) will not be graded. Homework should be identified as follows:

1) Student Name (Printed)
2) Student Instructor Assigned Number (Student ID #)
3) Chapter/lecture assigned (if there are problems from more than one Chapter, list other Chapters also).
4) Due Date

Begin each problem with the **Chapter/lecture Number** and then the **Problem number**. Problem #7 in Chapter 3 thus is shown as **"3.7"**. Place problems in proper order
Do not place additional designations on the HW such as "Homework # 2".

C) Term Group Project

There is one term group project, which will be discussed in class and completed throughout the term. Groups will be composed of about three (3) to five (5) students per group or as assigned. Students will be given the option to organize their own groups. Students without groups will be assigned to a team by the instructor. All instructions and relevant material for the term group project will be handed out at the scheduled date.

The group project is comprised of a Final Report and a Final Oral Presentation. Each submittal will receive a single group grade. However, the individual grade of each student depends on the individual portion of the student's work within the team. The final presentation will be evaluated by the peer groups.

The term group project submittals need to be turned in by the date and time they are due. The term group project and presentation represents **30%** of the student's final grade. The breakdown of the term group project grade is shown in GRADING section below.

PRESENTATION:

Students will form teams, prepare reports and make presentations to the class and the instructor. The teams' presentations and critique constitute 15% of the overall grade and will be graded on:

2%	Spelling/Grammar/Punctuation
2%	Subject Content & Thoroughness of topic discussion
2%	Verbal/Graphic Communication including presentation organization
2%	Documentation of references
2%	Overall Content

The teams' reports constitute 20% of the overall grade

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	≥ 90.0 – 100
B	= 80.0 – 89.9
C	= 70.0 – 79.9
D	= 60.0 – 69.9
F	< 60.0

* Any rounding which influences the final grade on any assignment, quiz, Test, Final Exam or overall course grade, is at the Instructor's discretion.

Course Grade

The course grade breakdown is as follows:

1)	Exam #1	20%
2)	Exam #2	20%
3)	Article Review (4 @ 4% ea)	16%
4)	Homework/AR	4%
4)	Class Attendance & Participation	5%
5)	Presentation	10%
6)	Research Report	25%
	TOTAL	100%

Attendance Policy: Students registered for **Section 001 (Class Number: 52782)** are expected to attend all classes. Distance Learning students **(Section 002-Class Number: 52789)** will participate in class discussions though email/Blackboard on a weekly basis. Class participation and discussions are essential for professional development and class credit.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Academic Integrity: Students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

> *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

Student Support Services: UT 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. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, **which is located to the right center or left of the classroom**. When exiting the building during an

emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.

Librarian: Sylvia George-Williams, Engineering Librarian, UT Arlington Science & Engineering Library, NH B03C, (817) 272-7519, sylvia@uta.edu

Make-up Exam and Assignments Policy: No make-up exams and assignments are given or accepted except for medical or other similar hardships where advanced arrangements are made with the instructor; or in case of non-selective medical emergencies with appropriate physician's note or documentation. Other than circumstances describe above, failure to take the exam or turn in assignments at the scheduled time will constitute a grade of zero in the exam and assignment. It is the student's obligation to contact the instructor, generally before the examination so that appropriate arrangement (if any) may be made.

Grade Grievance Policy: Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate / graduate catalog. Some instructors opt to cut and paste the relevant policy here. For undergraduate courses, see http://wweb.uta.edu/catalog/content/general/academic_regulations.aspx#19; for graduate courses, see http://grad.pci.uta.edu/about/catalog/current/general/regulations/#gradegrievances.

General Information:

Blackboard Site: Handouts, notes, articles, and other information are located on Blackboard

Minor adjustments to the syllabus may be necessary which will be posted on Blackboard.

Articles Review: Articles will be posted on Blackboard and are due by the dates shown on the class schedule. The articles are two to three pages long double spaced with font 12 (Arial, Times New Roman), one inch margins and cover at a minimum:

- Introduction
- A summary discussion of the main points which the author(s) addressed in the paper.
- The author(s)' s conclusion

Proper spelling, use of clear and concise sentences and structure will be considered in the grading process.

Provide a cover sheet which complies with UTA's Thesis and Dissertation (T&D) Guidelines that can be found at: http://grad.pci.uta.edu/students/services/thesis/. In addition, your last name must appear in the upper right corner and the page numbers must be centered in the bottom of each page. The paper shall follow the style guidelines as shown in UTA's Thesis Manual Style guides.

Research Paper: Students/assigned groups will submit a research topic in infrastructure asset management or policy for approval by **June 24**. The research paper will be completed and turned in at the beginning of the class on **August 7** prior to the scheduled presentations**.**

The research paper will be between 10 to 12 pages long double spaced with font 12 (Arial, Times New Roman), one inch margins. Its format and style guidelines should follow UTA's Thesis and Dissertation (T&D) Guidelines that can be found at: http://grad.pci.uta.edu/students/services/thesis/ and should cover at a minimum:

- Introduction
- Discussion of the topic
- Conclusion (value, lessons learned, etc…)
- References (minimum 10) with proper citations

Proper spelling, use of clear and concise sentences, structure, and compliance with UTA's formatting requirements will be considered in the grading process.

Your last name/Group Number must appear in the upper right corner and the page numbers must be centered in the bottom of each page.

A separate cover sheet must be included with the submission which shows each group member's name and the section of the research paper that the respective member developed. It is expected that each respective group member will provide equivalent level of contribution to the respective group's effort in the development and production of the presentation and associated research report. This is important to ensure an equitable grade distribution for this group effort.

Use of LAPTOP, I-pads, other electronic devices, or E-MAIL correspondence during class: In order to minimize disruption, the use of all electronic devices will not be allowed

during class. Students wishing to take notes via a laptop may do so only with prior permission from the Instructor.

CELL PHONE use in classroom during class: In order to minimize distractions, use of cell phones during class in the classroom is **prohibited**. Students must turn off their cell phones during class. If you are anticipating an important call, please inform the Instructor at the beginning of class and change the cell phone to "vibrate" mode. If your call comes through during class, leave the classroom quietly before beginning your conversation and return quietly as soon as the call is completed.

The Instructor reserves the right to adjust Students' grades as a result of class disruption due to cell phone or non-adherence to the above electronic device usage policy

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Course Outline

Class	Date	Day	Topic	Chapter	Instructor Guest Lecturer	AR and H/W Due
1	Jun 3	T	Describe Course Objectives and Introduction to Infrastructure		GAK	
2	5	TH	Introduction to Infrastructure		GAK	
3	10	T	Introduction to Asset Management		GAK	
4	12	TH	Asset Management Objectives		GAK	
5	17	T	Asset Management Strategies		GAK	AR1
6	19	TH	Asset Management Strategies		GAK	
7	24	T	Asset Management Planning – Research Topic Due		GAK	
8	26	TH	Economics Considerations		GAK	
9	JUL 1	T	MIDTERM EXAM		GAK/Proctor	
10	3	TH	Environmental and Social Considerations		GAK	
11	8	T	Financial Planning-		GAK	AR-2
12	10	TH	Financial Planning		GAK	
13	15	T	Case Study in accordance with Federal Requirements		GAK	
14	17	TH	Risk Management		GAK	
15	22	T	Risk Management		GAK	AR-3
16	24	TH	Water Infrastructure Asset Management/Decision Models		GAK	
17	29	T	Decision models		GAK	
18	31	TH	Total Asset Quality Management and other Considerations		GAK	AR-4
19	AUG 5	T	Group Presentation Preparation		TBD	
20	7	TH	Presentations and Final Report/Documentation and Recap		GAK	
21	12	T	FINAL EXAM	6-8 pm	GAK/Proctor	