Texas A&M University San Antonio

Water Resources Science and Technology (Energy Water)

Groundwater Assessment and Remediation Spring 2026

Meeting Time: Monday 11:00 am to 1:45 pm (Central Time)

Zoom Link: https://tamusa.zoom.us/j/84395570208

Instructor: Madjid Delkash

Email: mdelkash@tamusa.edu

Office Hours: Online (Zoom) by appointment. Please email to schedule a meeting.

Course Description

This course covers the core methods and professional practice framework used to assess contaminated sites and develop groundwater and soil remediation strategies. The course emphasizes practical application of environmental site assessment concepts and workflows, including ASTM-consistent approaches, historical and regulatory context, sampling and characterization, conceptual site model development, screening and risk concepts, and remedy selection. The remediation portion of the course focuses on groundwater and vadose-zone technologies, performance monitoring, and closure strategies, using real-world case examples.

Suggested Materials

- Surbeck, C. Q., and Kuo, J. (2021). *Site Assessment and Remediation for Environmental Engineers.* CRC Press.

  Additional readings, technical guidance, and selected articles will be provided through the course learning platform.

Learning Outcomes

By the end of this course, students will be able to:

1. Communicate technical information related to site assessment and remediation in oral and written formats.
2. Explain major concepts in site contamination and characterization, including transport and fate considerations and the role of physical, chemical, and biological processes.
3. Develop and refine a conceptual site model and use it to support assessment decisions and remedy selection.
4. Identify and use primary technical guidance and scientific literature relevant to common contaminants and remedial approaches.
5. Apply foundational concepts to the conceptual design of site remediation and to the evaluation of monitoring data and remedy performance.

Course Structure and Expectations

- Most class sessions will include an instructor-led lecture followed by a structured in-class group activity based on an assigned contaminated site scenario.
- Groups will prepare a short presentation summarizing their technical approach, assumptions, and recommendations. The instructor will ask questions and evaluate the group work each week.
- The course emphasizes consistent use of units, clear technical assumptions, and professional quality communication.

Course Grading

Grades will be posted in the course gradebook. Final grades will be based on the accumulated percentage of points earned out of the total points available.

Grade Distribution

- In-class group tasks: 40 percent
- Homework: 30 percent
- Final exam: 30 percent

Final Letter Grade Scale (Total Percentage)

- 90 to 100 = A
- 80 to 89 = B
- 70 to 79 = C
- 60 to 69 = D
- Below 60 = F

Assignments and Evaluation Details

In-class group tasks (40 percent)

For most classes, after the lecture portion, students will work in groups on an assigned site scenario (for example, a brownfield redevelopment site, fuel release, chlorinated solvent plume, or emerging contaminant scenario). Groups will prepare and deliver a brief presentation (approximately 10 minutes) summarizing:

- Site background and potential sources
- Data needs and assessment approach
- Conceptual site model elements
- Screening and risk-relevant considerations
- Remedy options and recommended next steps

The instructor will ask questions and evaluate each group's work during class.

Homework (30 percent)

Homework assignments focus on applied problem solving and professional practice tasks such as data interpretation, sampling approach selection, conceptual

site model components, and remedial technology evaluation. Assignment instructions and due dates will be provided in the course learning platform.

Final exam (30 percent)

The final exam will be open book and will evaluate understanding of the methods, concepts, and workflows covered throughout the semester.

Graduate student term paper (WATR 5375 students only, if applicable)

Graduate students may be required to submit a term paper consisting of a site assessment and remediation plan for a site involving an emerging contaminant (for example, PFAS). Requirements and evaluation criteria will be provided separately.

University Statements

This syllabus follows Texas A&M University San Antonio course expectations and policies. Students are responsible for complying with university requirements related to academic integrity, student conduct, accessibility and accommodations, and respectful learning environments. University policy statements and support resources will be provided through official university channels and the course learning platform.

Course Topics and Materials (Tentative)

The sequence below may be adjusted based on course pace, class needs, and availability of case materials.

1. What is a Brownfield: definitions, redevelopment drivers, and liability context
2. Environmental Site Assessment Phase I: historical review, records, reconnaissance, and reporting logic
3. Environmental Site Assessment Phase II: sampling design concepts and

confirmatory investigation

4. Soil and Groundwater Sampling: sampling approaches, QA/QC basics, and data usability
5. Site Conceptual Model: sources, pathways, receptors, and uncertainty management
6. Environmental Risk Concepts: exposure pathways, hazard concepts, and risk communication
7. Environmental Screening Levels: interpretation and use in decision-making
8. Site Remediation Workplan: objectives, performance metrics, and implementation planning
9. Groundwater Remediation: technology selection framework and performance expectations
10. Soil Vapor Extraction: vadose-zone remediation concepts and design considerations
11. Site Monitoring: performance monitoring, mass flux concepts, and long-term stewardship
12. Low Threat Closure: closure criteria concepts, documentation, and post-closure considerations