

CEV426 Environmental Remediation
Fall 2023

Recep Kaya Göktaş, rkaya.goktas@kocaeli.edu.tr, Room: 2028

Course Schedule:

Day: Wednesdays, 14:00 - 16:50, Classroom: 210

Office Hours:

Tuesdays: 11:00 – 12:00

Wednesdays: 11:00 – 12:00

Course Homepage: <http://rkgoktas.wordpress.com/cev426>

Course Objectives: The objective of this course is to provide an introduction to the theory and practice of soil and groundwater remediation to the fourth year environmental engineering students.

At the end of the course, you are expected to:

- develop an understanding of the fate of contaminants in soil and groundwater.
- have an introductory knowledge of the soil and groundwater remediation technologies.
- be able to do basic calculations for the analysis of contaminant fate in soil and groundwater.
- be able to do basic calculations for the analysis of the outcome of potential remediation technologies.

Course Content: Hazardous waste pollution and remediation engineering. Regulatory framework. Site assessment and remedial investigation. Nature of environmental contaminants. Chemical distribution among phases. Groundwater contamination. Groundwater flow. Mass transport in porous media. Retardation in the subsurface. Biodegradation and bioremediation. Source control. Pump-and-treat systems. Groundwater extraction. Recovery of non-aqueous phase liquids. Soil vapor extraction. DNAPL remediation. Sustainability concerns.

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Textbook:

- "Site Assessment and Remediation for Environmental Engineers". (2021). Cristiane Q. Surbeck & Jeff Kuo. CRC Press.

Supplementary Material:

- "Remediation Engineering: Design Concepts, Second Edition". (2017). Suthan S. Suthersan, John Horst, Matthew Schnobrich, Nicklaus Welty, Jeff McDonough. CRC Press.

- "Sustainable Remediation of Contaminated Sites" (2015). Krishna R. Reddy & Jeffrey A. Adams. Momentum Press.

- "Fundamentals of Hazardous Waste Site Remediation" (1998). Kathleen Sellers. CRC Press.

- "Chemical Fate and Transport in the Environment." (1999). Hemond, H.F., Fechner-Levy, E.J.

- "Applied Hydrogeology." (2000). Fetter, C.W.

- "Contaminant Hydrogeology". 1999. 2nd Edition. C. W. Fetter. Prentice Hall.

- "Integrated Environmental Modeling: Pollutant Transport, Fate, and Risk in the Environment". 2005. Anu Ramaswami, Jana B. Milford, Mitchell J. Small. Wiley.

- "Natural and Enhanced Remediation". 2001. Suthan S. Suthersan

- "Practical Handbook of Soil, Vadose Zone, and Ground-water Contamination: Assessment, Prevention, and Remediation". 2004. 2nd Edition. J. Russell Boulding & Jon S. Ginn. Lewis Publishers.

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Grading:

| Activity | Weight |
|---------------------|---------------|
| Class Participation | 14% |
| Homework I | 14% |
| Homework II | 14% |
| Midterm Exam | 28% |
| Final Exam | 30% |
| OVERALL | 100% |

Tentative Syllabus:

| Week | Date | What is going to be covered? |
|-------------|-------------|--|
| 1 | 3 Oct 2023 | Introduction to the Course |
| 2 | 10 Oct 2023 | Introduction to Remediation Engineering |
| 3 | 17 Oct 2023 | Common Properties of Chemicals and Soil Matrices |
| 4 | 24 Oct 2023 | Partition of Chemicals in Different Phases |
| 5 | 31 Oct 2023 | Regulations |
| 6 | 7 Nov 2023 | Risk Assessment |
| 7 | 14 Nov 2023 | Site Assessment and Remedial Investigation |
| 8 | 21 Nov 2023 | <i>Midterm Exam</i> |
| 9 | 28 Nov 2023 | Contaminant Transport in the Subsurface |
| 10 | 5 Dec 2023 | Vadose Zone Soil Remediation |
| 11 | 12 Dec 2023 | Groundwater Remediation |
| 12 | 19 Dec 2023 | Long Term Monitoring of Remediation Systems |
| 13 | 26 Dec 2023 | Sustainability of Remediation Projects |
| 14 | 2 Jan 2023 | <i>Student Presentations</i> |

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CLASS PARTICIPATION

Your participation in the class will be graded. It will contribute to 14% of your overall grade.

At the start of the semester, every student has **65 points**.

During the semester, you will be able to increase your points. **In-class contributions** (e.g. participating in meaningful discussions during the lectures) **may earn you 5 points**.

Any negative contribution (i.e. disturbing peaceful conduct of the lectures) **may lose you 5 points**.

You can check “**Diğer**” in the university’s online course system to see your current grade for class participation.

ATTENDANCE REQUIREMENT

You are required to attend **at least 70%** of the classes. I will collect your **signatures** at every class to check if you comply with the attendance requirement.

KOCAELİ ÜNİVERSİTESİ ÖNLİSANS VE LİSANS EĞİTİM-ÖĞRETİM YÖNETMELİĞİ

Devam koşulu

MADDE 17

(1) Öğrenci, ilk kez kayıt yaptırdığı teorik derslerin en az %70'ine, diğer öğretim türlerinin de en az %80'ine devam etmek zorundadır.

(5) Devam koşulu daha önce sağlanmış olan teorik dersin/derslerin tekrarı halinde devam koşulu ile programdaki ders çakışma durumu dikkate alınmaz.

(6) Öğrencilerin derse devamları, sorumlu öğretim elemanı tarafından yoklamalarla imza karşılığı tespit edilir. Devam durumu yarıyıl/yıl sonu akademik takvimde belirtilen derslerin tamamlandığı haftanın son gününe kadar ilgili öğretim elemanı tarafından ÖBS’de ilan edilir.