

# Ministry of Higher Education and Scientific research



Department of Soil and Water Sciences

College of Agricultural Engineering sciences

University of Salahaddin-Erbil

Subject: **Soil and Water Remediation** (Theoretical + Practical)

Course Book – *For* (4<sup>th</sup> year students)

Lecturer's name:

1- Asst. Prof. Dr. Tariq F. Sadiq (Theoretical part)

2- Assist. Lect. Huner Burhan Ismael (Practical part)

BSc. 2011, in Soil and Water/ University of Salahaddin-Erbil

MSc. 2017, in Soil and water/ Water Management (EIAM)

The University of Manchester – United Kingdom

**Academic Year: (2022-2023)**

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## Course Book

1. Course name	Spring semester 2022-2023
2. Lecturers in charge	Dr. Tariq F. Sadiq (MSc.) Mr. Huner Burhan Ismael
3. Department/ College	Soil and Water Sciences, Agricultural Engineering Sciences.
4. Contact	<a href="mailto:tariq.sadiq@su.edu.krd">tariq.sadiq@su.edu.krd</a> Tel: 009647504699925 or 009647704355844  <a href="mailto:huner.ismael@su.edu.krd">huner.ismael@su.edu.krd</a> Tel: 009647514664159
5. Time (in hours) per week	Theory: 2 hours per week Practical: 3 hours per week
6. Office hours	6 hours/week
7. Course code	
8. Teacher's academic profile	<p>My name is Tariq F. Sadiq and graduated from college of Agriculture/ Soil and Water Science in 2005-2006. My master's degree is in Soil Chemistry and Fertility (Salahaddin Uni. 2010). In 2011 I obtained a scholarship from KRG government to complete PhD in the Universiti Putra Malaysia. I finished the study in 2016 and return as lecturer. I promoted to Assist Prof in 2021. I have a number of articles published in national and international journals. I have 12 years teaching experience for different soil subjects.</p> <p>Huner Burhan Ismael, was born in Erbil in 1988. He graduated as an Agricultural Engineer (2011) from the Salahaddin University -Erbil, College of Agricultural Engineering Sciences with 2nd rank out of 35.</p> <p>During 2011 - 2015 he has worked as an assistant lecturer in the Soil and Water Department. At the beginning of 2015, the Iraqi federal government has offered him a scholarship to continue his MSc degree in Water Management / Environmental Impact Assessment and Management from The University of Manchester, United Kingdom (2017).</p>

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	<p>After completing his degree, he has returned to his work in the Department of Soil and Water Science since 2017.</p> <p>Time (in hours) per week                      Practical: 3h.    (35) Marks.</p> <p>Office hours (12)h//week Course code</p>
9-Keywords	Soil, Water, soil pollution, Water pollution, pollutants, waste, remediation, phytoremediation, chemical pollutant
<p>10- Course overview:</p> <p>The methods for removing dangerous contaminants from the environment are studied in this course.</p> <p>The theory underlying numerous technologies, with a focus on remediation strategies and their practical effectiveness.</p> <p>An explanation of the special difficulties involved in the cleanup of soil and water.</p>	
<p>11. Course objective:</p> <p>Goals of the course or Goals of studying Soil and Water Remediation:</p> <p>Students will receive an introduction to the idea and practice of remediation in this course.</p> <p>Increase your knowledge of how pollutants behave in soil and groundwater.</p> <p>Have a basic understanding of technology for remediating soil and groundwater.</p> <p>Have the ability to do simple calculations to analyze the fate of contaminants in soil and groundwater.</p> <p>Have the ability to perform simple calculations for the study of potential remediation technologies' results.</p>	
<p>12. Student's obligation:</p> <p>Lectures and Labs shall be given each Wednesday, attendance is required and absences will be reported at the end of each lab. A significant part has to be played by the student: In the classroom and in the lecture hall, students are required to take part in discussions on science. The significance of the tests, assignments, reports and</p>	

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assessments has to be understood by students. A student shall be involved in the presentation of an area of science.

### 13. Forms of teaching:

Forms of teaching:

- 1- Visual learning (Using PowerPoint including presenting a scientific Video for more interaction)
- 2- Using Board.
- 3- Lectures.

### 14. Assessment scheme

The distribution of marks for the course was as follows: 50% for the monthly examination, with 15 marks allocated for the theoretical component and 35 marks for the practical component (15 marks for the initial test, 15 marks for the subsequent test, and 5 marks for reports and activities). Within the theoretical component, 5 marks were allocated for the first examination, X marks for the second examination, and 5 marks for daily quizzes and report preparation. The final examination accounted for 50% of the total marks, with 50 marks allocated for the theoretical component exclusively.

### 15. Student learning outcome:

Increase your knowledge of how pollutants behave in soil and groundwater.

Have a basic understanding of technology for remediating soil and groundwater.

Have the ability to do simple calculations to analyze the fate of contaminants in soil and groundwater.

Have the ability to perform simple calculations for the study of potential remediation to results.

### 16. Course Reading List and References:

"Terra Nova's Environmental Remediation Resources" Terranovabiosystems.com. 2009-08-31. Retrieved 2011-03-22. Meagher, RB (2000).

"Phytoremediation of toxic elemental and organic pollutants". Current Opinion in Plant Biology 3 (2): 153–162. doi:10.1016/S1369-5266(99)00054-0 PMID10712958.

Diaz E (editor). (2008). Microbial Biodegradation: Genomics and Molecular Biology (1st ed.). Caister Academic Press. ISBN904455-17-4  
<http://www.horizonpress.com/biod>.

Lovley, DR (2003). "Cleaning up with genomics: applying molecular biology to bioremediation". Nature Reviews. Microbiology. 1 (1): 35–44.  
doi:10.1038/nrmicro731 PMID15040178.

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Brim H, McFarlan SC, Fredrickson JK, Minton KW, Zhai M, Wackett LP, Daly MJ (2000). "Engineering *Deinococcus radiodurans* for metal remediation in radioactive mixed waste environments". *Nature Biotechnology* 18 (1): 85–90. doi:10.1038/71986PMID10625398.

Usman, M. and Ho, Y.S., 2020. A bibliometric study of the Fenton oxidation for soil and water remediation. *Journal of Environmental Management*, 270, p.110886.

Roy, M., Giri, A.K., Dutta, S. and Mukherjee, P., 2015. Integrated phytobial remediation for sustainable management of arsenic in soil and water. *Environment international*, 75, pp.180-198.

17. The Topics:	Lecturer's name
1st Week What is Remediation?	Lecturer's name Dr. Tariq F. Sadiq ex: (5 hrs)  Huner Burhan Ismael ex: (2 x 3 hrs)
2nd Week Water pollution	
3rd & 4th Weeks Remediation of water pollution	
5th Week First Exam -- / 0- / 2023	
6th Week Soil pollution	
7th & 8th Weeks Remediation of soil pollution	
9th Week Bioremediation	
10th Week Second Exam -- / 0- / 2023	
11th Week Phytoremediation	
12th Class Presentations	
13th Week Presentation	

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18 Extra notes: Nothing
1. Peer review: