

Ministry of Higher Education and Scientific research



## **Postgraduate Course Book**

**Department: Environmental Science and Health  
Department**

**College: Science College**

**University: Salahaddin University**

**Subject: Soil Pollution**

**Course Book Level: M.Sc.; Second Semester**

**Lecturer's name: Assist. Prof. Dr. Nashmeel Saeed  
Khudhur**

**Academic Year: 2023/2024**

## Course Book

<b>1. Course name</b>	<b>Soil Pollution</b>
<b>2. Lecturer in charge</b>	<b>Dr. Nashmeel Saeed Khudhur (Ph.D.)</b>
<b>3. Department/ College</b>	<b>Department of Environmental Sciences and Health/ College of Science</b>
<b>4. Contact</b>	<a href="mailto:nashmeel.khudhur@su.edu.krd">nashmeel.khudhur@su.edu.krd</a>
<b>5. Time (in hours) per week</b>	Theory: 2
<b>6. Office hours</b>	2 hours
<b>7. Course code</b>	<b>MSc</b>
<b>8. Teacher's academic profile</b>	<p><b>Assist. Prof. Dr. Nashmeel Saeed Khudhur</b></p> <ul style="list-style-type: none"> <li>✓ Graduated in Biology Department-Microbiology in Salahaddin University/ College of Science (2001-2002).</li> <li>✓ Got M.Sc. in Biology Department/ Salahaddin University, (2006).</li> <li>✓ Got Ph.D. in Biology Department/ Salahaddin University, (2013).</li> <li>✓ Taught different subjects in the Departments of Biology and Environmental Science and Health for undergraduate and post graduate students.</li> <li>✓ Worked at different committees of Biology and Environmental Sciences Departments.</li> <li>✓ Has 24 scientific articles and 14 social articles.</li> <li>✓ Now I am the academic staff in Environmental Sciences and Health Department in the College of Science, Head of the Department's Quality Assurance and Curriculum Development Program, and teaching courses for Bachelor, Master's and PhD students.</li> </ul>
<b>9. Keywords</b>	Pollution, Soil, contamination, ecological risk, .... etc.
<b>10. Course overview:</b>	This course will cover the most important topics of soil pollution, which focus on the definition of pollution and their classification. This course also covers the description of the types of pollutants of soil like heavy metals, pesticides, polycyclic aromatic hydrocarbons ...etc. The student will take knowledge about application of some equations for calculation of soil pollution mathematically.
<b>11. Course objective:</b>	The aim of this course is to understand the principle soil pollution and method of determination of each pollutant, then quantification and calculation using different software.
<b>12. Student's obligation</b>	The student obligated during the course to attend two hours of theory and principles bases of soil pollution.
<b>13. Forms of teaching</b>	Class attending beside using different social media platforms are considered as the methods for teaching like using Telegram, Viber, Moodle, Google Meet, Zoom, Free Call Conference...etc.

#### 14. Assessment scheme

There will be 15 classes to be completed. Student's answer grades are break down as follow (without review article):

Seminar presentation = 10%  
 Quiz = 10%  
 Activities = 10%  
 Midterm exam = 20%  
 Final exam = 50%  
 Total score = 100%.

#### If with review article:

The assessment as follow:

Seminar presentation = 10%  
 Quiz = 10%  
 Review article = 10%  
 Midterm exam = 20%  
 Final exam = 50%  
 Total score = 100%.

#### 15. Student learning outcome:

The student must learn the whole course of soil pollution and determine the wanted pollutant from the soil by his-/herself.

#### 16. Course Reading List and References:

- CACHADA, A., ROCHA-SANTOS, T. & DUARTE, A. C. 2018. Soil and pollution: an introduction to the main issues. *Soil pollution*. Elsevier.
- DUARTE, A. C., CACHADA, A. & ROCHA-SANTOS, T. A. 2017. *Soil pollution: from monitoring to remediation*, Academic Press.
- KHAN, S., NAUSHAD, M., LIMA, E. C., ZHANG, S., SHAHEEN, S. M. & RINKLEBE, J. 2021. Global soil pollution by toxic elements: Current status and future perspectives on the risk assessment and remediation strategies—A review. *Journal of Hazardous Materials*, 417, 126039.
- LUO, Y. & TU, C. 2018. *Twenty years of research and development on soil pollution and remediation in China*, Springer.
- MIRSAL, I. A. 2008. *Soil pollution*, Springer.
- MISHRA, R. K., MOHAMMAD, N. & ROYCHOUDHURY, N. 2016. Soil pollution: Causes, effects and control. *Van Sangyan*, 3, 1-14.
- MORILLO, E., ROMERO, A., MAQUEDA, C., MADRID, L., AJMONE-MARSAN, F., GRICMAN, H., DAVIDSON, C., HURSTHOUSE, A. & VILLAVARDE, J. 2007. Soil pollution by PAHs in urban soils: a comparison of three European cities. *Journal of Environmental Monitoring*, 9, 1001-1008.
- PAZ-FERREIRO, J., GASCÓ, G., MÉNDEZ, A. & REICHMAN, S. M. 2018. Soil pollution and remediation. MDPI.
- SAKSHI, SINGH, S. & HARITASH, A. 2019. Polycyclic aromatic hydrocarbons: soil pollution and remediation. *International Journal of Environmental Science and Technology*, 16, 6489-6512.
- SIMEONOV, L. & SARGSYAN, V. 2008. *Soil chemical pollution, risk assessment, remediation and security*, Springer.
- TRASAR-CEPEDA, C., LEIROS, M., SEOANE, S. & GIL-SOTRES, F. 2000. Limitations of soil enzymes as indicators of soil pollution. *Soil Biology and Biochemistry*, 32, 1867-1875.
- YARON, B., CALVET, R. & PROST, R. 1996. *Soil pollution: processes and dynamics*, Springer Science & Business Media.

#### 17. Topics Program

Lecture's

	Name
<b>Week 1: Introduction.</b>	<b>Assist. Prof. Dr. Nashmeel Saeed Khudhur</b>
<b>Week 2: Major types of soil pollutants.</b>	
<b>Week 3-5: Sources of soil pollution.</b> <b>Natural and anthropogenic sources.</b> <b>Industrial activities.</b> <b>Urban and transport infrastructure.</b> <b>Mining.</b> <b>Waste and sewage generation and disposal.</b> <b>Military activities and ware.</b> <b>Agriculture and livestock activities.</b>	
<b>Week 6-12: Main pollutants in soil:</b> <b>Heavy metals.</b> <b>Pesticides.</b> <b>Polycyclic aromatic hydrocarbons.</b> <b>Nitrogen and phosphorus.</b> <b>Persistent organic pollutants.</b> <b>Pathogenic microorganisms.</b> <b>Radioactive substances.</b> <b>Nanoparticles.</b>	
<b>Week 13: Bioavailability, mobility and degradation of contaminants.</b>	
<b>Week 14: Impacts of soil pollution on the food chain and ecosystem services.</b>	
<b>Week 15: Management and remediation of polluted soils.</b>	

\* Must have permission of the Scientific and Higher Education Committee