

24MS803 Chemical Processes and Environmental Fate of Contaminants 2-1-0-3

Course Outcomes:

CO1: Understand the fate and transport and biogeochemical transformation of emerging contaminants

CO2: Comprehend the restoration technologies of degraded soils from specific industrial activities

CO3: Analysis of sustainable and green remediation technologies for a clean environment

Emerging Contaminants: Mass Transfer Processes, Contaminant Fate, and Transport of industrial chemicals, pesticides, and pharmaceutically active compounds; Bioaccumulation and Biomagnification; Risk assessment and basic ecotoxicology. Chemical Reactions and Processes in Soil and Water, Biogeochemical phases in soil and water; environmental chemistry of soil solution and aqueous environments; activity and bioavailability

Environmental Chemistry/ Restoration of Degraded Soils Chemistry of soil acidity and acid-impaired soils; restoration of soil impacted from industrial activities; restoration of salt degraded soil; soil chemical processes of fertilizer, pesticides, and other organic chemical contaminants and persistent organic compounds and their impact on water quality.

Soils and Chemical Pollution, Restoration of urban, agricultural and industrial contaminated soils. Concepts and methods of remediation of contaminated soil, Innovative Remediation Technology; Sustainable and Green Remediation Technologies: remediation methods (soil washing, contaminant immobilization, phytoremediation, etc), bioavailability-based remediation, and long-term fate of contaminants.

Textbooks and References:

Morin-Crini, Nadia, Eric Lichtfouse, and Grégorio Crini. Emerging Contaminants Vol. 1. (65). Springer International Publishing, 2021

Bell, Caitlin H., et al. (ed.). Emerging contaminants handbook. CRC Press, 2019

Soil and Water Chemistry: An integrative approach. 2004. Michael E. Essington, CRC Press, Boca Raton, FL.

Environmental Chemistry of Soils. 1994. M.B. McBride. Oxford University Press, New York.

Environmental Soil Chemistry, 2nd ed. Nov 2002. Donald Sparks, Academic Press.

Chemical Equilibria in Soils. 2003. W.L. Lindsay, Blackburn Press, Caldwell, NJ.

Chemical Processes in Soils. 2005. M.A. Tabatabai and D.L. Sparks (Eds.) Soil Science Soc. of America (SSSA) Book Series 8. SSSA, Madison, WI. (soils.org)

Evaluation Pattern

Continuous Assessment	30 %
Mid Term	30%
End Semester	40%