

Microbial Resource Management in Engineered and Natural Ecosystems

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SPEAKER



Dr. Ramesh Goel

Professor of Civil & Environmental Engineering, The University of Utah

ABOUT THE SPEAKER:

Dr. Ramesh Goel is an environmental engineering professor and graduate director in the Department of Civil & Environmental Engineering at the University of Utah. His research focuses on the interface of process engineering, ecosystem sustainability, and environmental microbiology, with emphasis on nutrient management in municipal wastewater treatment, activated sludge innovations, harmful algal blooms, virology, and computational bioinformatics. His work is supported by the U.S. National Science Foundation, USEPA, U.S. Department of Defense, Department of the Interior, and various local agencies and water quality boards. He has published over 100 papers in journals including Nature Communications, Environmental Science & Technology, Water Research, Bioresource Technology, Environmental Pollution, Chemosphere, Science of the Total Environment, and Scientific Reports. Dr. Goel is Associate Editor of Environmental Engineering Science, Chemosphere, and Journal of Hazardous Materials Letters, and serves on the editorial boards of several international journals.

ABSTRACT

Microbiology studies microorganisms and their roles in biochemistry, physiology, ecology, and evolution. In natural and engineered ecosystems, performance depends not only on individual species but also on complex community interactions and emergent properties. Understanding these interactions is essential for optimizing bioreactors, improving ecological interpretation, and advancing environmental engineering through microbial resource management (MRM), which links microbial community structure to ecosystem function. This interdisciplinary framework integrates environmental engineering, microbiology, ecology, computer science, modeling, and health sciences. The seminar will present innovations in wastewater treatment and genomic tools for understanding reactor function, highlighting the high and previously under appreciated diversity of microbial physiology. Advances in molecular and computational methods are providing deeper insight into microbial community dynamics, improving reactor optimization and ecosystem understanding. Examples from engineered and natural systems will illustrate microbial complexity, followed by Dr. Goel's vision for the resource recovery center.

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