Emerging concepts in Municipal Wastewater Treatment

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Overview

The objective of this short course is to introduce students to important emerging concepts in biological wastewater treatment, provide them tools to address these issues and have them learn the recent research findings related to these emerging concepts. ***Please note that, this will be a demanding course where students will be assigned take home reading assignments and tested in class through daily quizzes. The purpose of this course is to expose students to the interdisciplinary and changing paradigm of wastewater treatment engineering such that when they practice in the society, either as professional engineers or research scholars, they can think outside the conventional paradigm and make a difference in their career and the society***.

Conventionally, municipal wastewater treatment incorporates removals of organic compounds expressed in terms of BOD and COD, ammonia nitrogen and phosphorus. Because removal of these three different categories of chemicals requires different redox potentials measured with respect to the presence of oxygen, conventional municipal wastewater treatment plants generally have larger foot prints and greater energy demands. Modern wastewater treatment paradigm asks for energy neutrality and resource positivity of municipal wastewater treatment plants. In this regard, process manipulation, incorporation of energy efficient process such as anaerobic ammonia oxidation, granular activated sludge process and nutrient recovery are considered as significant components of modern wastewater treatment planning. The wastewater industry is poised for significant innovation driven by resource recovery, energy neutrality, smaller foot prints, and reduced greenhouse gas emissions in wastewater treatment plants. Modern wastewater treatment plants are now designed to remove contaminants of emerging concern, experience minimal sludge bulking and be energy efficient. This short course is designed to disseminate knowledge to attendees related to the basic principles of municipal wastewater treatment to innovative developments in wastewater treatment concepts.

Objectives

At the end of this course, students will be;

1. Able to think critically about the need to source separate waste, recover important resources and design experiments.
2. Able to design innovative biological treatment processes to remove carbon, nitrogen and phosphorus in energy efficient way. This will include the design of anaerobic ammonia

oxidation, granular activated sludge process and main stream anaerobic ammonia oxidation.

3. Able to understand the issues related to the presence of contaminants of emerging concerns and able to integrate modern design/management practices in conventional design approaches. These contaminants include hormones, antibiotics and pharmaceuticals.
4. Able to appreciate the role of environmental microbiology in process engineering.
5. Finally, the students will be introduced to important lab and field practices/protocols that are needed to study some of the aforementioned emerging environmental issues.

Modules	**Duration : December 17 – December 21, 2018** **Venue : Department of Civil Engineering, NIT Patna** **Number of participants for the course will be limited to 50 (fifty) only.**
You Should Attend If…	▪ **Executives, engineers and researchers from manufacturing, service and government organizations, including R&D laboratories.** ▪ **Student at all levels (B.Tech/M.Sc/M.Tech/PhD) or faculty from reputed academic institutions and technical institutions.** ▪ **Faculty from reputed academic institutions and technical institutions.**
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $500** **Industry/ Research Organization : Rs 5,000/-** **Faculty : Rs.3,000/-** **Student : Rs 1,000/-** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty

Dr. Ramesh Goel is a professor of environmental engineering and microbiology at the University of Utah. He obtained his doctoral degree in environmental engineering from the University of South Carolina with Dr. Joe Flora and his Post-Doctoral research training at the University of Wisconsin with Dr. Daniel Noguera. He was a visiting faculty at Radboud University, The Netherlands and EAWAG, Switzerland in 2014. Dr. Goel researches in nitrogen and phosphorus cycling in engineered and natural ecosystems, resource recovery from urban waste streams, bacteriophage mediated bacterial diversity (through gene transfers) in engineered reactors, natural ecosystem and human gut microbiome and, determining the tipping point in natural ecosystems for harmful algal bloom formation. He uses advanced high throughput DNA and RNA sequencing followed by bioinformatics to study prokaryotic diversity, ecophysiology and abundance in different systems. He is the recipient of NSF's prestigious CAREER award, American Society for Microbiology's professorship to India and numerous research and teaching related awards at the department and college levels. He has been serving as graduate director of the department, the chair of AEESP Lecture committee, chair of WEFTEC research symposium committee, secretary of the United States of America National Committee of IWA, member of AEESP student services committee, associate editor of Water Research, Water Environment Research and Current Pollution Reports". He has received numerous awards at the University of Utah including best teacher and best mentor awards in 2009 and 2010 respectively. HE is currently serving in editorial boards of "Water Research" and "Water Environment Research".

For more information visit: https://faculty.utah.edu/u0504160-RAMESH_GOEL/hm/index.hml
https://scholar.google.com/citations?user=aq_YLRQAAAAJ&hl=en

Co-ordinator

Dr. Nityanand Singh Maurya is an associate professor of environmental engineering in Civil Engineering Department at NIT, Patna. He obtained his Bachelor in Civil Engineering from MIT Muzaffarpur, M.Tech in Environmental Science and Engineering, NERIST Itanagar and PhD in Civil Engineering (environmental engineering) from IIT Delhi. He researches in Adsorptive processes, microbiological quality of drinking water, faecal sludge management, resource recovery, GHG emission from sanitation and wastewater treatment.

For more information visit:
https://scholar.google.com/citations?user=ACKI2bEAAAAJ&hl=en

Course Co-ordinator

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